

CDR-882

DUAL DRIVE CD RECORDER



DualBurn

CDR-882 DUAL DRIVE CD RECORDER

USER MANUAL





La versión en español del manual de operaciones la encontrará en la web de HHB: www.hhb.co.uk

La version française de ce manual d'utilisation est disponible sur le site web de HHB: www.hhb.co.uk

Eine deutsch Version dieser Bedienungsanleitung ist im Internet unter der Adresse: www.hhb.co.uk erhältlich.

Important Safety Instructions

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with dry cloth.
- 7 Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This apparatus is supplied with a remote control unit which contains replaceable non-rechargeable batteries. The remote control unit and the batteries must not be exposed to excessive heat such as sunshine, fire or the like. The disposal of used batteries should be in accordance with local re-cycling and waste disposal regulations. Never dispose of batteries in a fire because they may explode and cause injury.

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

It is important that the apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases shall be placed on the apparatus.

- Do not expose this apparatus to drips or splashes.
- Do not place any objects filled with liquids, such as vases, on the apparatus.
- Do not install this apparatus in a confined space such as a book case or similar unit.
- Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating. Please ensure adequate space around the apparatus for sufficient ventilation. Ventilation should not be impeded by covering the ventilation openings with items, such as newspapers, tablecloths curtains etc.
- The apparatus draws nominal non-operating power from the AC outlet with its POWER switch in the off position.
- The apparatus should be located close enough to the AC outlet so that you can easily grasp the power cord plug at any time.
- An apparatus with Class I construction shall be connected to an AC outlet with a protective grounding connection.
- The MAINS plug or the appliance coupler is used as the disconnect device. Either device shall remain readily operable when the apparatus is installed for use.
- No naked flames, such as lighted candles, should be placed on the apparatus.

WARNING: excessive sound pressure levels from earphones and headphones can cause hearing loss.

Important Safety Precautions



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol, within equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

For U.S.A.

TO THE USER

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference . And (2) This device must accept any interference received including interference that may cause undesired operation.

CAUTION:

This product satisfies FCC regulations when shielded cables and connectors are used to connect the unit to other equipment. To prevent electromagnetic interference with electric appliances such as radios and televisions, use shielded cables and connectors for connections.

For Canada

TO THE USER

This Class B digital apparatus complies with Canadian ICES-003

Cet appareil numerique de la Classe B est conforme a la norme NMB-003 du Canada

This appliance has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.

Model Number:

Serial Number:

Safety Information

This product has been designed and manufactured according to FDA regulations "title 21, CFR, chapter 1, subchapter J, based on the Radiation Control for Health and Safety Act of 1968", and is classified as a class 1 laser product. There is no hazardous invisible laser radiation during operation because invisible laser radiation emitted inside of this product is completely confined in the protective housings.

CAUTION

- DO NOT REMOVE THE PROTECTIVE HOUSING USING A SCREWDRIVER.
- USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.
- IF THIS PRODUCT DEVELOPS TROUBLE, CONTACT YOUR NEAREST QUALIFIED SERVICE PERSONNEL, AND DO NOT USE THE PRODUCT IN ITS DAMAGED STATE.



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Introduction

Thank you for buying this HHB Professional product. The CDR-882 DualBurn CD Recorder is designed to record and replay audio CDs in a broadcast or other professional audio environment, and incorporates a number of features and facilities that may be unfamiliar to users. In particular, the CDR-882 permits the recording of programme material of longer duration than could normally be accommodated on one CD by recording across two or more separate discs, with user-programmable intelligent cross-fading between consecutive discs. It also permits two discs to be burnt simultaneously with the same programme.

We recommend that you read this instruction manual at least as far as the Basic Operation section, to familiarise yourself with the unit's layout, controls and operating system before use. The Advanced Operation covers the more specialised features of the CDR-882 and can be referred to as required once you are familiar with the unit's basic functions.

Please keep this manual in a safe place once you are sufficiently familiar with the CDR-882 to use it without referral. You may need it in the future.

Important - Please register your CDR-882 with HHB Communications at <http://www.hhb.co.uk>. Registering your machine will help us in providing you with after-sales service should the need arise, and may also be of assistance in the event of the unit being stolen.

Environment - The CDR-882's range of operating temperature and relative humidity (RH) are as follows:

Temperature: +5°C to +35°C (41°F to 95°F)

RH: less than 85%

Altitude: 2000m (operational), 15000m (non-operational)

Do not use the CDR-882 in a location where:

- its ventilation apertures are blocked
- it is in direct sunlight or strong artificial light

What's in the box

Unpacking

Unpack the CDR-882 and its accessories with care. It is always a good idea to store all packaging (if practical), in case you ever need to return the unit to your HHB dealer for any reason.

The shipping carton should contain the items listed below. Please contact your HHB dealer immediately if any of them are missing or damaged.

- CDR-882 Dual-drive CD recorder
- Instruction manual
- IEC-to-UK/EU/US power cable, as appropriate
- Infra-red remote control handset
- 2 x AA batteries
- 2 x HHB CDR80HS CD-R discs

CDR-882 Primary Features

- Two shock-mounted recordable disc drives
- 64x128 pixel backlit dot matrix LCD display
- 11-segment dual LED bargraph meters with PPM characteristics
- Separate LED indication of drive status and headphone source
- Balanced (+4dBu) and unbalanced (-10dBu) analogue inputs and outputs
- 24-bit A/D conversion with dither on recording
- S/PDIF digital input and output (coaxial and optical TOSlink), with full DAT track ID and PQ-code recognition/transmission, and SCMS defeat
- AES/EBU digital input and output
- Switchable dither on digital inputs
- Word clock input
- Built-in sample-rate conversion (32-96kHz) on inputs
- DiscSpan mode - continuous recording across two or more discs, with automatic fade-in/fade-out and definable overlap period and track ID point on each disc
- Manual change-over operation available with DiscSpan
- DualBurn mode - simultaneous recording onto both drives
- Multi-Machine modes for longer unattended recording time and/or multiple disc (>2) recording
- CD copy function with track editing option
- Fast auto-finalise modes - one disc finalises while other disc records
- Parallel remote control port with user-defined functionality
- 2 x RS232 serial remote control ports (for master and slave operation)
- 10 second RAM shock buffer
- Accepts all blank CD-R media (HHB CDR80HS recommended)
- Analogue and digital input level controls
- Front panel headphone output with level control
- Comprehensive infra-red remote control handset (RC-882)
- Full SCMS control on recordings
- CD Text support
- Front and rear PS/2 keyboard inputs (for text input)
- 2U 19" rack mount chassis
- Universal power supply

Cautions and guidance on installation

Safety Guidelines

- Operate only on a secure and level surface or securely fastened into a rack, noting the precautions below
- This equipment must be earthed (grounded)
- This equipment must be powered from a polarised AC supply
- Only suitably trained personnel should service this equipment
- Please read and take note of all warning and informative labels
- Before starting any servicing operation, this equipment must be isolated from the AC supply (mains) by removing the incoming IEC mains connector
- Fuses should only be replaced with ones of the same type and rating as that indicated
- Operate only in a clean, dry and pollutant-free environment
- Do not operate in an explosive atmosphere
- Do not allow any liquid or solid objects to enter the equipment. Should this accidentally occur then immediately switch off the unit and contact your service agent

Installation

If the CDR-882 is being installed in a rack, care should be taken not to block the ventilation slots on the rear, top and left-hand side. Although the CDR-882 itself does not generate a significant degree of heat, it should never be installed immediately above or below another piece of equipment that does, such as a power amplifier. It is good practice in any case to fit vent blanks of at least 1U above and below such equipment in a rack (unless they short-circuit that equipments' own fan-cooling, in which case plain blanks should be fitted).

Care with ventilation should similarly be taken if the unit is free-standing; never stack it on top of or underneath another piece of equipment which generates a significant amount of heat.

Take care when routing cables around the unit; never drape cables across the front panel of the CDR-882 as they may obstruct the disc tray eject mechanisms.

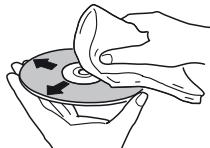
Do not install or use the CDR-882 in a position where it is in direct sunlight or high-intensity artificial light. Never attempt to move the unit while it is in operation.

Care & cleaning

Always switch off and disconnect the unit from the mains before cleaning. The outside surfaces of the unit may be cleaned with a soft dry cloth. For stubborn marks (such as from a liquid spillage), a soft damp cloth may be used in conjunction with a mild detergent solution (dilute a household detergent cleaner 5:1 with water). Wipe thoroughly dry with a dry cloth after. NEVER use solvent cleaners of any kind.

Always switch the unit off and disconnect it from the AC supply before moving it. NEVER move the unit while it is in use, as this may permanently damage the disc(s) and/or the laser mechanisms.

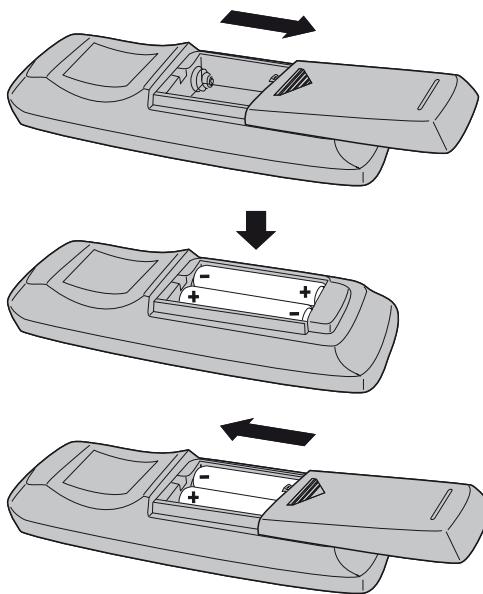
CDs should ALWAYS be handled with care. Hold discs only by the edge or the centre hole. Never put discs "face down" on any surface as they can scratch easily. Smudges and fingerprints may be removed from a disc's playing surface by wiping it gently with a soft, lint-free cloth "across" the disc radius. Never rub circumferentially. Stubborn marks can be removed by applying a small amount of isopropyl alcohol (distilled water is often as effective), again with a soft, lint-free cloth. Alternatively, use a commercially available CD cleaning kit. NEVER use solvent cleaners of any kind.



Installing the Remote Control batteries

To insert the batteries in the infra-red remote control handset:

- Slide off the battery compartment lid on the rear of the handset
- Insert two AA batteries, taking care to orientate them the correct way (refer to markings within the battery compartment)
- Slide battery compartment lid back on



Important! Please observe the following guidelines when replacing batteries:

- Always change both batteries at the same time
- Always use two batteries of the same brand and type
- Dispose of the old batteries in a responsible manner
 - always observe local environmental guidelines

Using the RC-882 Remote Control handset

- Make sure there are no obstacles between the handset and the unit
- The handset should work reliably within 7m of the unit, and within 30° of the direct line between the handset and the unit
- Strong sunlight or fluorescent lighting may make remote control operation less reliable
- Remote control handsets for different equipment sometimes interact. If the CDR-882 is installed adjacent to other infra-red-controlled equipment, you should satisfy yourself that the CDR-882's handset is not affecting the other equipment, or vice-versa. One or more items may need to be moved if interaction is observed
- A falling-off of the operating range of the handset will generally indicate that it is time to change the batteries

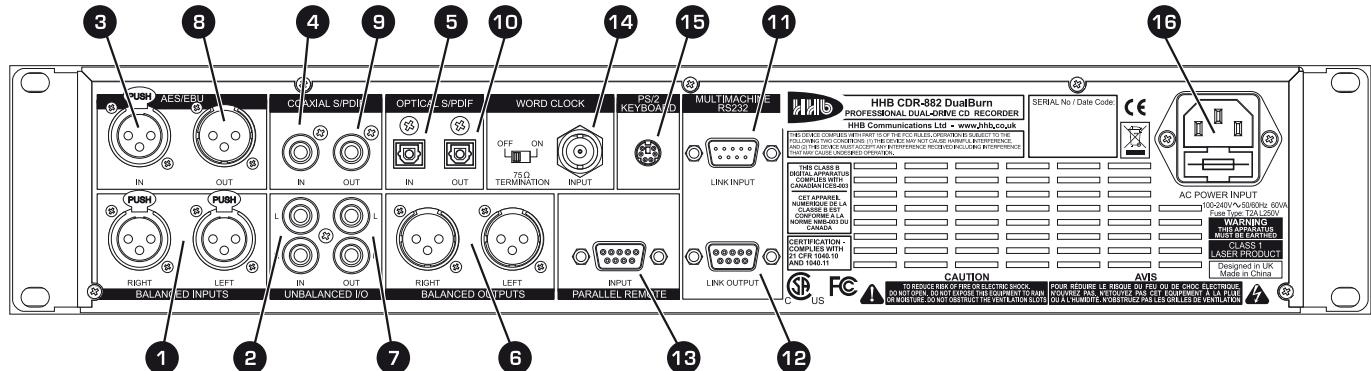
Compatible disc types

The CDR-882 supports various CD types:

- Red Book standard pressed audio CDs (play)
- Red Book (CD-DA) audio on data or "audio" CD-R discs (play and record), including unfinalised discs
- Red Book (CD-DA) audio on data or "audio" CD-RW discs (play and record), including unfinalised discs

NOTE: The CDR-882 does not play or record audio in the form of data files (such as .wav or .mp3) on any disc format.

Connectivity



All electrical connections to the CDR-882 (apart from headphones and/or keyboard) are made via the rear panel.

Audio Inputs

- 1**: Electronically-balanced analogue Left and Right in (2 x XLR3F)
- 2**: Unbalanced analogue Left and Right in (2 x phono/RCA)
- 3**: AES/EBU input (XLR3F)
- 4**: S/PDIF input (phono/RCA)
- 5**: S/PDIF input (optical TOSlink connector)

Audio Outputs

- 6**: Electronically-balanced Left and Right analogue out (2 x XLR3M)
- 7**: Unbalanced Left and Right analogue out (2 x phono/RCA)
- 8**: AES/EBU output (XLR3M)
- 9**: S/PDIF output (phono/RCA)
- 10**: S/PDIF output (optical TOSlink connector)

Other Connectors

- 11**: RS232 remote control port (D9M)
- 12**: RS232 link connector (D9F)
- 13**: Parallel remote control, function-programmable (D9F)
- 14**: Word clock input (BNC)
- 15**: QWERTY keyboard connector (PS/2)*
- 16**: AC mains input (IEC)

*The keyboard connector is duplicated on the front panel.

Connector Details

- 1**: **Balanced L & R analogue inputs.** These are electronically-balanced on XLR3F connectors and can accept audio levels of up to +24dBu without clipping. Nominal input sensitivity is set at +4dBu for a digital level of -18dBFS. Nominal input impedance is 10kΩ. The pinout for this (and all other inputs and outputs) can be found at page 51.

Note that the CDR-882 has one set of audio inputs only; internally, the input signals are routed to both disc drives.

- 2**: **Unbalanced L & R analogue inputs.** Unbalanced analogue inputs on phono connectors (RCA jacks) are also provided. Nominal input sensitivity is -10dBu for a digital level of -18dBFS. Maximum input level at these connectors is +10dBu. Input impedance is 10kΩ.

- 3**: **AES/EBU digital input.** Professional 2-channel digital audio input conforming to AES3-1992 (r1997) amendment 4-1999. Connector is an XLR3F, input impedance is 110Ω.

- 4**: **S/PDIF Coaxial digital input.** Semi-pro/consumer 2-channel digital audio input on a phono connector (RCA jack), conforming to IEC60958-4. DAT track ID and PQ-code recognition are enabled at this input and the SCMS flag is under operator control. (See page 48).

- 5**: **S/PDIF Optical digital input.** An S/PDIF digital audio input can alternatively be applied via the optical TOSlink connector using a suitable fibre-optic cable (less than 3m in length recommended).

All digital inputs can accept data at a sample rate of between 32 & 96kHz. The signal is sample-rate converted internally to the CD standard of 44.1kHz.

Note that recordings on the CDR-882 will only be made using one of the input connectors (1) to (5) above at any one time. The active input is set via the front panel **I/P SELECT** button. (See page 13).

- 6**: **Balanced L & R analogue outputs.** These are electronically-balanced on XLR3M connectors, and will drive a maximum audio level of +22dBu for 0dBFS. Nominal output level is set at +4dBu for a digital level of -18dBFS. Nominal output impedance is less than 100Ω.

- 7 Unbalanced L & R analogue outputs.** These carry the same audio signal as the main outputs (1) above, but in unbalanced form on phono connectors (RCA jacks) at a nominal level of -10dBu. Output level is calibrated internally to be +8dBu from a maximum (digital clip) PCM signal level of 0dBFS. Output impedance is 47Ω.
- 8 AES/EBU out.** This provides a two-channel AES/EBU digital output conforming to AES3-2003. The connector is an XLR3M, output impedance 110Ω.

- 9 S/PDIF Coaxial digital output.** A 2-channel "semi-pro" digital output conforming to the IEC60958-4 is available at this connector. Transmission of CD PQ codes and CD Text data are enabled in the S/PDIF data stream; the signal is otherwise the same as that available at the AES/EBU connector (8).

Note that the channel status bits denoting whether the digital outputs are "Pro" or "Consumer" may be set via the menu system (**Record > Digital Output Format**), and that this setting applies to both the AES/EBU and S/PDIF digital outputs.

Also note that the S/PDIF output is used in Multi-Machine modes to pass audio, clock and CD Text data between units.

- 10 S/PDIF Optical digital output.** Standard TOSlink connector carrying the same signal as (9) above, in optical form. Use a standard optical TOSlink cable of not more than 3m. length.

- 11 RS232 Link Input connector.** The CDR-882 can be fully controlled remotely via RS232 serial commands. Pinout, port parameters and an abridged command set can be found at page 13. This port permits one or more (see (12) below) CDR-882s to be controlled from a dedicated computer with appropriate software, or by a proprietary external control system (Crestron, AMX, etc.). A "crossed" cable (i.e., one with transmit and receive pins cross-connected) should be used when controlling the CDR-882 from an external control system. A D9M connector is used.

- 12 RS232 Link Output connector.** This allows control information to be passed from Master to Slave units in Multi-Machine mode. It also allows multiple CDR-882s to be controlled from a single RS232 controller.

The link connector is a D9F. The pinout is the same as the RS232 input, except that the Data transmit and receive pins (2 & 3) are reversed. Thus when "daisy-chaining" CDR-882s, "straight" cables must be used, in which all connections between machines are "pin-to-pin". Note that in multi-machine modes, the "master" CDR-882 generates control data for the connected "slave" units.

Note that the RS232 link connector only passes control data, not audio. In multi-machine modes, the audio signals need to be distributed to multiple CDR-882s separately using S/PDIF interconnections. See page 42 for full details of Multi-Machine operation.

- 13 Parallel remote control connector.** The CDR-882's basic transport commands can also be implemented by volt-free contact closure at the pins of this connector (a D9F). Five of the pins are designated as inputs, three as outputs (tallies). The functions controlled by each of the inputs are user-definable via the menu system. The source of the tally outputs is similarly definable. Full information, including pinout, is available at page 51. Assignment of inputs and outputs is performed via the menu system; see page 36 for full details.

- 14 Word Clock input.** An input for an external 44.1kHz digital audio word clock is provided on a BNC socket. The input impedance is either 75Ω or high-impedance, set by the termination switch adjacent to the connector.

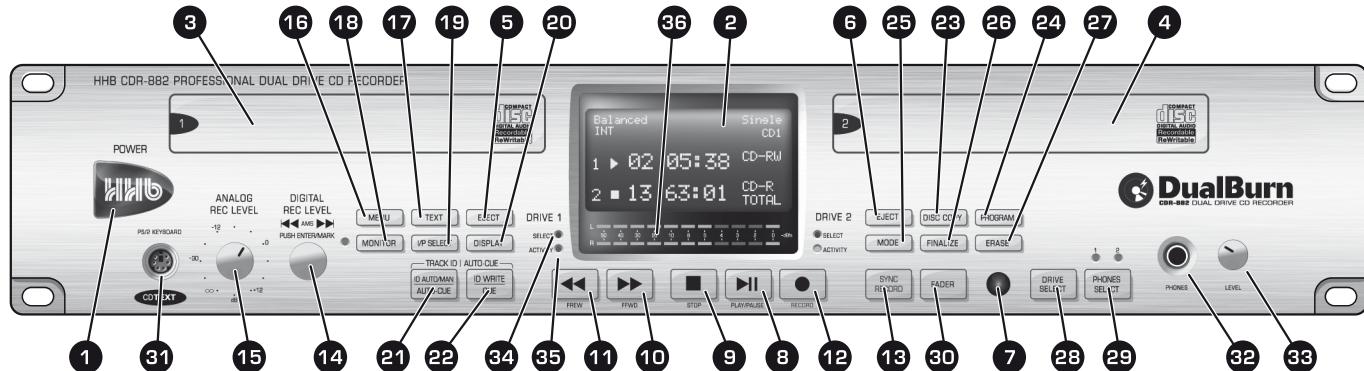
Word clock selection and routing is done via the menu system; see sections page 21 & page 31.

- 15 Keyboard input.** A PS/2 connector is available on both front and rear panels for the connection of a standard QWERTY keyboard. The CDR-882 supports CD Text with audio CDs in both record and replay modes, and connection of a standard keyboard provides a rapid means of entering textual data to be displayed on the front of suitably-equipped CD players (including the CDR-882).

- 16 AC mains input.** The CDR-882 is powered via a standard IEC connector. The CDR-882's design includes a universal power supply and will accept all AC mains voltages from 100 to 240V, 50 to 60Hz.



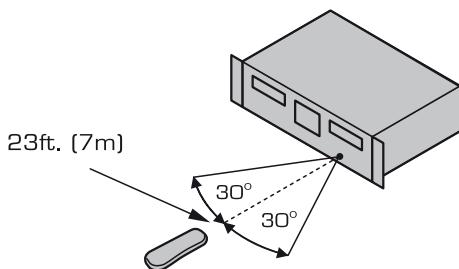
Front Panel Features



All the CDR-882's controls are on the front panel. Note that many of the unit's functions and setup options are controlled and selected through the menu system, using the multi-character LED matrix display, which is shown enlarged on page 15.

- 1 AC power switch.
- 2 Alphanumeric LED dot matrix display
- 3 Disc tray (Drive 1)
- 4 Disc tray (Drive 2)
- 5 EJECT button (Drive 1)
- 6 EJECT button (Drive 2)
- 7 Infra-red remote control sensor
- 8 PLAY/PAUSE button
- 9 STOP button
- 10 FFWD button
- 11 FREW button
- 12 RECORD button
- 13 SYNC RECORD button
- 14 AMS/Digital record level control, with ENTER/MARK push function
- 15 Analogue record level control
- 16 MENU button
- 17 TEXT button
- 18 MONITOR button
- 19 I/P SELECT button
- 20 DISPLAY button
- 21 ID AUTO/MAN | AUTO-CUE button
- 22 ID WRITE | CUE button
- 23 DISC COPY button
- 24 PROGRAM button
- 25 MODE button
- 26 FINALIZE button
- 27 ERASE button
- 28 DRIVE SELECT button
- 29 PHONES SELECT button
- 30 FADER button
- 31 Keyboard socket
- 32 Headphone socket
- 33 Headphone level control
- 34 Drive select LEDs
- 35 Drive activity LEDs
- 36 Bargraph meter

- 1 AC power switch.** The large HHB logo at the left-hand of the front-panel is the push-button on/off switch, and is illuminated when the unit is on.
- On power-up, the display shows the HHB and DualBurn logos, followed by **No Disc** if there is no disc in a drive, or **Reading** if there is. Note that for most CDR-882 functions, the upper main line of the display shows the status of Drive 1, the lower that of Drive 2.
- 2 Alphanumeric display.** The multi-character LED dot matrix display is described in detail on page 15.
- 3 Disc tray (Drive 1).** The disc drive accepts one disc at a time. The drawer is motorised and can be manually opened and closed with the EJECT button (5). When the drawer is open, the display shows **Open**. (NOTE: If open with the unit unpowered, the drawer closes automatically on power-up.)
- 4 Disc tray (Drive 2).** As (3). The drawer can be operated with the EJECT button (6).
- 5 EJECT button (Drive 1).** Opens and closes Drive 1's disc tray. See page 20 for full details.
- 6 EJECT button (Drive 2).** Operation as (5).
- 7 Remote control sensor.** The infra-red sensor receives commands from the remote control handset. Keep the sensor unobstructed to ensure correct functioning. The range of reliable operation of the handset is shown in the diagram below.



NOTE: The CDR-882's main transport controls (8) to (12) normally only operate on one drive at a time, depending on the drive selected with the **DRIVE SELECT** button (28).

- 8 PLAY/PAUSE button.** Press from STOP to start playback. If pressed during PLAY, playback will pause, and resume on a further press. The display indicates PLAY mode with the ▶ symbol, or PAUSE mode with the || symbol. The green ▶ || in the button illuminates, steadily in PLAY mode and flashing in PAUSE mode. See page 20 for more details.
- 9 STOP button.** Pressing this button stops the disc from all transport modes. The display shows the symbol ■ and the yellow ■ symbol in the button illuminates.

- 10 FFWD button.** Press and hold from PLAY to scan (search) forward through the current track at increased speed, with audio. Search speed increases the longer the button is pressed. PLAY resumes when the button is released. See page 20 for more details.
- 11 FREW button.** This button has exactly the same function as the FFWD button (10) above, except that the search direction is reversed.
- 12 RECORD button.** Press to prepare the drive for recording. After checking disc type, etc., the drive enters RECORD PAUSE mode. Recording is started by pressing the **PLAY/PAUSE** button, which "releases" the paused state. See page 21 for more details.
- 13 SYNC RECORD button.** Press to start recording on detection of a start trigger (e.g. a Track ID code or audio level). **SYNC RECORD** also invokes Track ID marking. See page 24 for full details.
- 14 AMS/Digital Rec Level control.** Multi-purpose rotary control with "press" function. As a rotary control, it performs Automatic Music Search (AMS) to locate to a particular track. It also provides the means of navigating the menu system when in MENU mode.
- The "press" function acts as an **ENTER** button in menu navigation to select submenus and options. In PLAY mode, it is used as a **MARK** button, to store the current play position so it can be easily re-located to. See page 24 (AMS) and page 27 (Menu Navigation) for more details.
- 15 Analogue Rec Level control.** This is a conventional record level control for use when either of the analogue inputs are selected as the input source. Record level is displayed on the bargraph meters.
- 16 MENU button.** Pressing this button puts the CDR-882 into MENU mode. A variety of unit parameters and settings may be adjusted and selected via the menu system. These include word clock source selection, setting of the various multi-drive recording modes, parallel remote control port setup, etc. See page 27.
- 17 TEXT button.** Selecting TEXT mode allows CD Text data to be entered, using a PS/2 QWERTY keyboard connected to either of the keyboard sockets. The text data can be seen on the LED display as it is entered.
- CD Text can be entered during or after recording, but must be done so prior to finalising the disc.
- More information on using CD Text can be found at page 45.
- 18 MONITOR button.** Press to monitor the selected input source. The adjacent LED illuminates when **MONITOR** is enabled. See page 23.
- 19 I/P SELECT button.** This determines which of the CDR-882's five sets of inputs is to be used as a recording source (only one input at a time may be selected). The selected source is indicated in the display. Pressing the **I/P SELECT** button repeatedly scrolls through the options, which are (in sequence):



See page 22 for more information about input selection.



Front Panel Features

- 20 DISPLAY button.** This button changes the time display option for the selected drive. The options available will depend on the drive's current Status (e.g. STOP, PLAY, etc.). See page 22 for full details.
- 21 ID AUTO/MAN | AUTO-CUE button.** This button has two distinct functions, depending whether a disc is being recorded or not:
- a) **Auto/manual Track ID selection:** Switches between automatic and manual track numbering when recording a disc. See page 13 for more information.
 - b) **Auto-Cue mode selection:** Allows selection of Auto-Cue and Auto-Pause modes when not recording. See page 46 for more information.
- 22 ID WRITE | CUE button.** This button also has two distinct functions, depending whether a disc is being recorded or not:
- a) **ID Write:** Pressing this button during RECORD, when TRACK ID MANUAL mode has been selected with [21] above, writes a track ID to the CD in the selected drive(s).
 - As an ID is written, **ID Write** illuminates briefly in the bottom left-hand corner of the display, and the track number in the time display increments by one.
 - b) **Cue button:** When the CDR-882 is not in RECORD mode, the button acts as a **CUE** button. Pressing **CUE** will immediately locate to a previously-stored MARK point (see page 13), entering PLAY mode at the cue point. If AUTO-CUE or AUTO-PAUSE mode is active, or if the drive is already in PAUSE mode, the drive enters PAUSE at the cue point. When a MARK point is stored, drive number is included, thus **CUE** can be used to locate to a point on the other drive if wished. See page 46 for more information.
- 23 DISC COPY button.** This selects the CDR-882's DISC COPY function, which allows the user to make a copy of an existing CD, CD-R or CD-RW from one drive to the other at high-speed (with certain restrictions). A full description of the DISC COPY function can be found at page 41.
- 24 PROGRAM button.** The PROGRAM function, activated by pressing PROGRAM, is used for two different purposes:
- a) PROGRAM PLAY mode - permits tracks to be replayed in a non-sequential order
 - b) PROGRAM COPY mode - allows a copy to be made of a CD, but with individually selected tracks, sequenced in any order on the copy.
- The PROGRAM functions are described in detail at page 44 (PROGRAM PLAY mode) and page 44 (PROGRAM COPY mode).

- 25 MODE button.** This button is used to define the basic record/playback mode of the CDR-882 when both drives are in use. Pressing **MODE** repeatedly scrolls through the options; the display indicates the selected option. The options are (in sequence):

MODE	ACTION	DISPLAY
Single CD	Records or plays from one drive only; select Drive 1 or 2 with DRIVE SELECT button	Single CD1 or Single CD2
DualBurn	Records an external input on both drives simultaneously	DualBurn or DualBurn CD1 CD2
DiscSpan	Records to or plays from each drive alternately (for as long as appropriate CDs are loaded)	DiscSpan or DiscSpan CD1 CD2

The various twin-disc modes are described in more detail in section page 39.

- 26 FINALIZE button.** Press to manually start disc finalisation (to make the CD playable in a standard audio CD player). Auto finalisation is set via the menu system, see page 34.

- 27 ERASE button.** Press to erase the whole disc, a range of tracks or to carry out a full initialisation of the disc. It is also possible to do a full erase or initialisation of discs in both drives simultaneously. Applicable to CD-RW discs only

Press the **ENTER** button [14] to start the process.

See section page 47 for more information about erasing discs.

- 28 DRIVE SELECT button.** This button is used to select which drive is currently being controlled by the CDR-882's main transport buttons and other front panel controls.

The "active" drive is indicated by inverse video in the main display area. Additional indication is provided in the top right-hand corner of the display by **CD1** or **CD2**, and the blue Drive Select LEDs (34).

- 29 PHONES SELECT button.** This button selects which drive is to be the source for the headphone monitor output [32]. Pressing the button scrolls between the three available options, which are: Drive 1, Drive 2, or a mix of audio from both Drive 1 and Drive 2. In the case of the last option, the precise nature of the mix heard is determined by the **Phones Mix** settings in the **Audio** sub-menu. See page 30 for further details.

The two green LEDs immediately above the button indicate the option selected.

- 30 FADER button.** The CDR-882's FADER function allows playback or recording to start or end with a smooth fade-in or fade-out as appropriate. The fade-in and fade-out times used are set via the **Audio** sub-menu of the menu system. See page 29 for more details.

The actual operation of the FADER function will depend on the CDR-882's status when the button is pressed.

STATUS	ACTION ON PRESSING FADER
STOP mode	Playback starts from track 1 with fade-in
PLAY mode	Audio fades out, drive enters PAUSE mode
PAUSE mode	Playback resumes, with fade-in
RECORD PAUSE mode	Recording starts from paused location, record level fades up
RECORD mode	Record level fades down, unit enters RECORD PAUSE mode

Fade-in and fade-out are confirmed on the display by the flashing legend **FADE-IN** or **FADE-OUT**.

- 31 Keyboard socket.** This PS/2 socket is a duplicate of that on the unit's rear and is for the connection of a QWERTY keyboard for CD Text data entry.
- 32 Headphone socket.** Connect a pair of stereo headphones via the 1/4" jack socket monitoring for private listening. The stereo signal available at this connector is determined by the setting of the **MONITOR** and **PHONES SELECT** buttons [18] and [29] respectively, and also the **Phones Mix** option in the **Audio** submenu. Headphones with a minimum impedance of 32Ω should be used.
- 33 Headphone level control.** This is a conventional analogue volume control for the headphone output.
- 34 Drive select LEDs.** Each drive has a blue SELECT LED (each side of the main display).

One SELECT LED will always be illuminated, according to the selection made with the **DRIVE SELECT** button (27). (Note that if one drive already has a disc inserted at power-up, it will be selected as the active drive automatically.)

- 35 Drive activity LEDs.** Each drive has a tricolour ACTIVITY LED (each side of the main display).

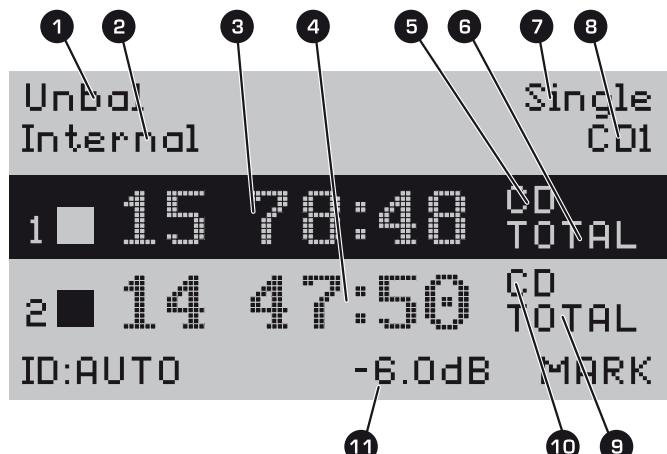
The LED indicates the current status of each drive.

LED INDICATION	STATUS
Off	No disc in drive
Amber	Disc loaded, drive in STOP mode
Green (blinking)	Drive in PLAY mode
Green (flashing)	Drive in PAUSE mode
Green (steady)	Drive is source in COPY mode
Red	Drive in Record Mode

- 36 Bargraph meter.** This 11-segment stereo bargraph meter provides indication of record or playback level, depending on the **MONITOR** button [18] and **Output Mix** settings in the **Audio** submenu.

The meter has digital scaling, from -40dBFS to 0dBFS.

Alphanumeric Display



The front-panel transreflexive 128 x 64 pixel LCD gives disc timing information and transport mode for each drive in large text and symbols, plus additional textual information such as currently selected input, media type in use, operational mode, 'active' drive, etc. in a smaller font at the top of the display.

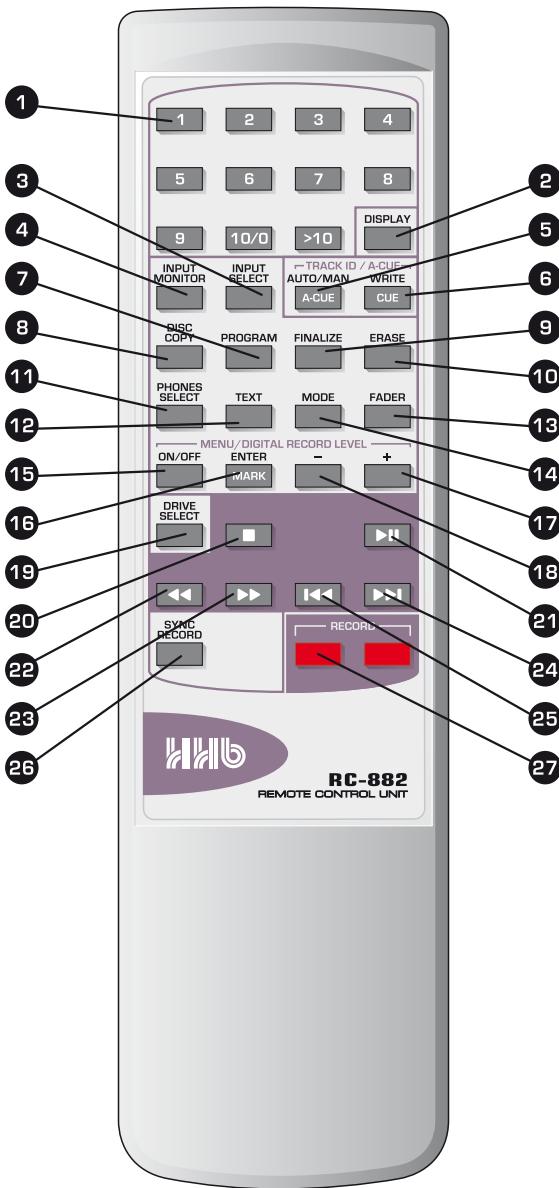
- 1** Currently selected input - **Balanced, Unbal, AES/EBU, Coax, Optical**
- 2** Word clock source - **Internal, DIG, WCLK**
- 3** Track number and time display for **Drive 1**
- 4** Track number and time display for **Drive 2**
- 5** Media type in Drive 1 - **CD, CD-R, CD-RW**
- 6** Time display option for Drive 1 - **TRACK, REMAIN, TOTAL, TOTREM**
- 7** Record/Playback mode - **Single, DualBurn, DiscSpan**
- 8** Currently 'active' drive - **CD1 or CD2**
- 9** Time display option for Drive 2 - **TRACK, REMAIN, TOTAL, TOTREM**
- 10** Media type in Drive 2 - **CD, CD-R, CD-RW**
- 11** Peak signal level indication. *

* Provides a numeric indication, in dBs, of peak signal level relative to clip. (Clip is taken as 0dB, thus all indications are negative). Only displayed during RECORD, or when input monitoring is selected.

The RC-882 Remote Control Unit (infra-red handset) supplied with the CDR-882 duplicates many of the front panel buttons in both function and operation. Some additional keys are also provided: a set of 0-9 numeric keys for direct access to individual CD tracks, dedicated NEXT and PREVIOUS keys and a RECORD safety key.

Note: "see (*)" refers to associated front panel features.

- 1 Direct Access keys – see note below.
- 2 DISPLAY – see (20)
- 3 INPUT SELECT– see (19)
- 4 INPUT MONITOR – see (18)
- 5 TRACK ID AUTO/MAN and AUTO-CUE – see (21)
- 6 TRACK ID WRITE and CUE – see (22)
- 7 PROGRAM – see (24)
- 8 DISC COPY – see (23)
- 9 FINALIZE – see (26)
- 10 ERASE – see (27)
- 11 PHONES SELECT– see (29)
- 12 TEXT – see (17)
- 13 FADER – see (30)
- 14 MODE – see (25)
- 15 MENU ON/OFF – see (16)
- 16 ENTER/MARK – equivalent to "push" function of AMS control (14)
- 17 "+" key – equivalent to rotating AMS control (14) clockwise when in MENU mode
- 18 "-" key – equivalent to rotating AMS control (14) anticlockwise when in MENU mode
- 19 DRIVE SELECT – see (28)
- 20 STOP – see (9)
- 21 PLAY/PAUSE – see (8)
- 22 FREW – see (11)
- 23 FFWD – see (10)
- 24 NEXT – equivalent to rotating AMS control (14) clockwise when not in MENU mode
- 25 PREVIOUS – equivalent to rotating AMS control (14) anticlockwise when not in MENU mode
- 26 SYNC RECORD – see (13)
- 27 RECORD (two buttons) - see (12 and note below)



Direct Access keys

These operate in the following way:

- To start playback at tracks 1 to 9, press the corresponding 1 to 9 key
- To start playback at track 10, press the 10/0 key
- To start playback at a track numbered 11 or higher, press the >10 key, followed by the separate digits of the track number. Thus to select track 15, press >10, 1 and 5 in order

Record keys

Two red record keys are provided on the handset; to activate the CDR-882's Record mode, press both buttons simultaneously.

Quick Start Guide

This section is intended to get you going quickly with the CDR-882's most basic functions when you use it for the first time. It also tells you where to look in the manual to get additional information about many aspects of the CDR-882's operation.

NOTE: The numbers following the various controls and connectors in the instructions below refer to the front and rear diagrams on page 12 and page 10 respectively.

Recording a CD from an analogue source

This describes the simplest method of recording a CD in Drive 1 from an analogue source, entering track markers manually.

1. Connect the analogue audio source to either the balanced inputs (XLRs [1]) or unbalanced inputs (phonos [2]).
2. Open Drive 1's disc tray with the **EJECT** button [5], insert a blank CD-R, and close the tray.
3. Press the **I/P SELECT** button [19] until the display shows **Balanced** or **Unbal**, depending which inputs you connected to in Step 1.
4. Connect a suitable pair of headphones to the front panel headphones socket [32], and press the **PHONES SELECT** button [29] so that the **1** LED above is illuminated.
5. Press the **RECORD** button [12]; the display will show **Record Setup** and then enter RECORD PAUSE mode (indicated by a steady red symbol in the **RECORD** button and a flashing green symbol in the **PLAY/PAUSE** button [8]). The green **MONITOR** LED (adjacent to [18]) will also be illuminated.
6. Play a sample of the source programme, and adjust the **ANALOG REC LEVEL** control [15] to obtain a meter indication that only causes the amber segments to illuminate on the loudest sections of the programme. If necessary, adjust the output level of the source device as well. Use the headphones to ensure that the sound is not clipping or otherwise distorting.
7. Stop the source and re-locate the programme to its start. Press the **PLAY/PAUSE** button [8] to start the recording, and play the source programme. Track 1 is now being recorded.
8. To create a new track (at a suitable point in the programme), press the **ID WRITE | CUE** button [22]. The track number will increment to **02**.
9. The recording can be stopped by pressing the **STOP** button [9]. Further tracks may be added by repeating the above from Step 5.
10. When you have recorded all the tracks needed, press the **FINALIZE** button [26], and then press the **ENTER** button [14] in answer to the question **Finalize?** to complete the record process. The disc may now be removed from the drive by pressing the **EJECT** button [5].

Recording a CD from a digital source

This describes the simplest method of recording a CD in Drive 1 from a digital source, entering track markers manually.

1. Connect the digital audio source to the AES/EBU (XLR [3]) or S/PDIF input (phono [4] or TOSlink [5]).
2. Open Drive 1's disc tray with the **EJECT** button [5], insert a blank CD-R, and close the tray.
3. Press the **I/P SELECT** button [19] until the display shows **AES/EBU**, **Coax** or **Optical**, depending which input you connected to in Step 1.
4. Connect a suitable pair of headphones to the front panel headphones socket [32], and press the **PHONES SELECT** button [29] so that the **1** LED above is illuminated.
5. Press the **RECORD** button [12]; the display will show **Record Setup** and then enter RECORD PAUSE mode (indicated by a steady red symbol in the **RECORD** button and a flashing green symbol in the **PLAY/PAUSE** button [8]). The green **MONITOR** LED (adjacent to [18]) will also be illuminated.
6. Play a sample of the source programme, and check the meter indication. It should only cause the amber segments to illuminate on the loudest sections of the programme. If the level appears satisfactory, proceed to Step 8; if adjustment is required, go to Step 7 first. Use the headphones to ensure that the sound is not clipping or otherwise distorting.
7. The digital recording level may be adjusted by pressing the **MENU** button [16], selecting the **Audio** submenu (the first) with the **AMS** control [14], then selecting the **Dig Input Level** option (the first) in the submenu – press the **ENTER** button [14] to select at each menu level. The recording level can then be adjusted with the **AMS** control. Exit the menu system by pressing the **MENU** button three times.
8. Stop the source and re-locate the programme to its start. Press the **PLAY/PAUSE** button [8] to start the recording, and play the source programme. Track 1 is now being recorded.
9. To create a new track (at a suitable point in the programme), press the **ID WRITE | CUE** button [22]. The track number will increment to **02**.
10. The recording can be stopped by pressing the **STOP** button [9]. Further tracks may be added by repeating the above from Step 5.
11. When you have recorded all the tracks needed, press the **FINALIZE** button [26], and then press the **ENTER** button [14] in answer to the question **Finalize?** to complete the record process. The disc may now be removed from the drive by pressing the **EJECT** button [5].



Playing a CD

1. Connect a stereo audio amplifier (and speakers) to either the balanced outputs [XLRs [6]] or unbalanced outputs [phonos [7]].
2. Open Drive 1's disc tray with the **EJECT** button [5], insert the CD to be played, and close the tray.
3. When the disc's TOC has been read, the number of tracks and the disc's total playing time is displayed. To start playback at Track 1, press the **PLAY/PAUSE** button [8]. The display confirms the track number [**01**], and the time changes from **Total** to **Track**.*
4. To start playback from any other track, rotate the **AMS** control [14] clockwise until the number of the required track is shown, then press either **ENTER** or **PLAY/PAUSE**.
5. Playback may be paused at any time by pressing **PLAY/PAUSE**, and resumed by pressing **PLAY/PAUSE** again. Playback may be stopped by pressing the **STOP** button [9].

*If the CD contains CD Text, the CD Title will be displayed instead when it is loaded. Press **TEXT** [17] to display the Artist Name. After **PLAY/PAUSE** is pressed, the display shows the Track Title. **DISPLAY** [20] may be pressed at any time to resume the track number/elapsed time display.

Playing one disc while recording another

The dual drive capability of the CDR-882 allows one CD to be played while another is recorded, in the same machine. This feature will be useful when seminars, conferences or Houses of Worship services, etc., are being recorded, with the intention of providing attendees with CDs of the event very soon after it finishes.

Assume that we wish to record on Drive 2 while playing another CD in Drive 1.

1. Connect a stereo audio amplifier (and speakers) to either the balanced outputs [XLRs [6]] or unbalanced outputs [phonos [7]].
2. Connect the source to be recorded to the appropriate set of inputs – analogue [1] or [2] or digital [3], [4] or [5].
3. Open Drive 1's disc tray with the **EJECT** button [5] and insert the CD to be played; open Drive 2's disc tray with the **EJECT** button [6] and insert a blank CD-R. Close both trays.
4. When the discs have been read, and the display is showing the contents of the disc in Drive 1, select Drive 2 by pressing the **DRIVE SELECT** button [28]. Drive 2's track information (zero if the disc was blank) will be in reverse video.
5. Press the **I/P SELECT** button [19] until the display shows the name of the input being used (the inputs you connected to in Step 2).
6. Press the **MENU** button [16], with the **AMS** control/**ENTER** button [14], navigate to the **Phones Mix** option in the **Audio** submenu. Set this to **Priority CD1**.

7. So that the rear output connectors carry the playback audio from Drive 1, navigate to the **Output Mix** option in the **Audio** Submenu and set it to **Priority CD1**; exit the menu system by pressing **MENU** again until the normal display appears.
8. If recording from an analogue source, perform Steps 5 and 6 of "Recording a CD from an Analogue Source" above. If recording from a digital source, perform Steps 5 and 6 (and 7 if necessary) of "Recording a CD from a Digital Source" above. In either case, the source programme can be monitored via the speakers instead of the headphones.
9. Recording may now be started in Drive 2 by pressing the **PLAY/PAUSE** button [8].
10. Press the **DRIVE SELECT** button [28] to select Drive 1.
11. The green LED adjacent to the **MONITOR** button [18] will now flash.
12. The disc in Drive 1 may now be played by pressing the **PLAY/PAUSE** button [8]. Playback will be heard, commencing with Track 1; the **AMS** control [14] may be used to select a different track (see Step 4 of "Playing a CD" above).
13. The audio output may be monitored in the headphones and switched between Drive 1 (playback) and Drive 2 (signal being recorded) with the **PHONES SELECT** button [29]. (The "Mix" setting - with both LEDs on - will select Drive 1's playback because **Priority CD1** was selected in Step 6.)
14. The transport controls may be switched – by pressing **DRIVE SELECT** – between the disc being played in Drive 1 and the disc being recorded in Drive 2, to suit the operator's needs. The disc being recorded will need to be finalised as normal when recording is complete.

Reference List of the CDR-882's other main functions

TO DO THIS	REFER TO SECTION	ON PAGE
Start and end a CD recording automatically from DAT/MD subcodes or audio level detection	Synchronised Recording	page 24
Search through a disc at high speed	FFWD & FREW	page 20
Fade-in and/or fade-out of a track, in either playback or record	Fader	page 21
Change the disc time information being displayed	Time Displays	page 22
Insert Track IDs automatically while recording	Tracks IDs	page 25
Finalise a disc automatically when recording has finished.	Finalising	page 25
Override automatic Word Clock selection	Internal & External Clocks	page 38
Store and locate to a marker point	Manual Cueing	page 46
Record two discs at once	DualBurn Record	page 39
Make a recording spanning two or more discs	DiscSpan Mode	page 39
Make a high-speed copy of a disc	Disc Copy	page 41
Make simultaneous or sequential recordings on multiple CDR-882s.	Multi-Machine Operation	page 42
Play a sequence of specific tracks on a disc	Program Play	page 44
Copy selected tracks from one disc to another	Program Copy	page 44
Use CD Text	CD Text	page 45
Cue up to a track accurately	Auto-Cue	page 46
Erase some or all tracks from a disc	Erasing Discs	page 47
Control the copy-protection setting on a disc	SCMS Considerations	page 48
Control the CDR-882 remotely	Remote Control	page 49

Basic Operation

Disc insertion and removal

The disc drive trays may be opened with the EJECT buttons [5 & 6] and closed either with a second press of EJECT, or by gently pushing the front of the tray.

When placing a disc in the tray, ensure that it is located correctly in the recess before attempting to close the tray to avoid jamming the mechanism or damaging the disc. Note that there is a second inner recess to accommodate discs of 8cm diameter.

The display reads **Open** while the tray is open, and **Close** while it is closing. When an empty tray is fully retracted, the display reads **No Disc**.

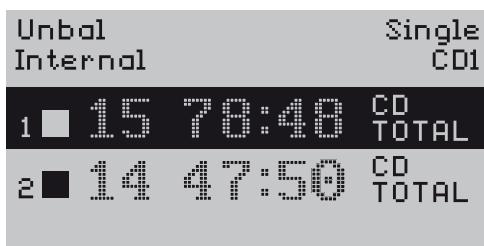
If the tray is closed with a disc inserted, the display shows **Reading** while the disc's TOC (if any) is read; once this is completed, the drive enters STOP mode, with the display either indicating the number of tracks on the discs and the CD's total playing time, or any CD Text information on the disc.

The **EJECT** buttons are always disabled when the relevant drive is in RECORD or RECORD PAUSE mode. Additionally, they can be disabled in all transport modes other than STOP via the menu system (see page 37).

Drive selection

The CDR-882's two disc drives are functionally identical. Either may be used for playback or recording. In the various dual-disc modes supported by the CDR-882, disc copying from one drive to another in either direction and recording on both drives simultaneously are both possible. (See page 39 for more information regarding dual disc modes).

The unit's main transport buttons [8 -12] only control one drive at a time; the DRIVE SELECT button [28] selects which drive is "active" for control functions, and toggles between them. The selected drive is indicated by the two blue SELECT LEDs [34], and the drive's display will be shown in reverse video. In addition, either **CD1** or **CD2** will be indicated in the upper right-hand area; these remain visible in Menu Mode.



Certain rules apply regarding automatic drive selection at power-up:

- Drive 1 is selected by default if neither drive contains a disc
- If Drive 2 already has a disc inserted, it is selected after initialisation and disc reading
- If both drives contain discs, Drive 1 is selected after initialisation and disc reading

Transport Controls

A standard set of five CD drive buttons is provided, which operate on the currently-selected drive. The transport buttons are illuminated and colour-coded, and their functions are duplicated on the RC-882 remote control. Additional track locating functions are available with the **AMS** control.

Play/Pause

The function of the **PLAY/PAUSE** button depends on the drive's current mode:

- If the drive is in STOP when **PLAY/PAUSE** is pressed, the drive enters PLAY mode and playback commences at Track 1*. PLAY mode is indicated by a steady LED in the **PLAY/PAUSE** button and a **▶** symbol in the display
- If **PLAY/PAUSE** is pressed while the drive is already in PLAY mode, the drive enters PAUSE mode, playback stops and the disc is paused at the current location. PAUSE mode is indicated by a flashing **PLAY/PAUSE** button LED, and a **||** symbol in the display and a flashing Drive Activity LED
- Pressing **PLAY/PAUSE** when the drive is in PAUSE mode puts the drive back into PLAY mode and playback resumes from the paused location

* An exception to this is if Program Play is active and the first programmed track is not Track 1.

The **PLAY/PAUSE** button is also used to begin recording. See RECORD below.

Stop

Pressing **STOP** while the drive is in PLAY mode stops the drive and playback ceases. The display returns to the 'initial loading' state, showing the number of tracks and total time. Re-selecting PLAY will always start playback with Track 1 (unless Program Play is active and the first programmed track is not Track 1). STOP mode is indicated by the **STOP** button LED and a **■** symbol in the display.

FFWD & FREW

Pressing these buttons in PLAY mode engage SEARCH. The track is scanned at increased speed, either forwards (FFWD) or backwards (FREW). Audio continues to be replayed during search, but at a lower output level. Search speed is dependent on how long the button is pressed; holding the button down for longer increases the search speed incrementally up to a maximum of 20x normal speed. SEARCH mode is cancelled when the button is released.

Pressing **FFWD** or **FREW** from PAUSE mode scans the disc in the same manner, but audio remains muted.

SEARCH modes are indicated by the symbols **◀◀** or **▶▶** in the display, and the buttons' internal green symbols also illuminate.

Manual Record

The **RECORD** button is only enabled if certain conditions are met. These are that i) there is a blank recordable disc in the selected drive and ii) that if the currently-selected input is one of the three digital inputs, there is a valid signal (AES/EBU or S/PDIF) at the input connector (even though it may have zero audio content).

If the conditions are met, pressing the **RECORD** button initialises the blank disc. The LCD display flashes **Record Setup** for the drive being used, and the ● symbol in the **RECORD** button and the drive activity LED both flash red.

Initialisation takes a few seconds, after which the drive enters RECORD PAUSE mode. This is confirmed by a steady **RECORD** button LED, a flashing ● symbol in the display and a flashing green LED in the **PLAY/PAUSE** button.

Recording may be started by pressing the **PLAY/PAUSE** button, which puts the drive into RECORD mode. The symbol ● in the display and the LED in the **PLAY/PAUSE** button stops flashing.

Selecting a track (AMS)

NEXT and PREVIOUS functions are performed with the rotary **AMS** control. Rotating it 'one click' clockwise will advance the cue point of the currently-selected drive to the start of the next track. Similarly, one anticlockwise click moves the cue point to the start of the current track, two anticlockwise clicks to the start of the previous track.

Any track on a disc may be selected for playback by rotating the **AMS** control more than one 'click'.

While re-locating, the display temporarily shows the symbol ►► or ◀◀ as appropriate.

Other factors concerning the operation of the AMS control are:

- From STOP, as a track is selected, the length of the track is displayed and the beginning of the track is cued and pre-loaded into memory for Instant Start. Playback is started by pressing either **PLAY/PAUSE** or **ENTER**. Press **STOP** to cancel this cue mode
- Rotating counter-clockwise from the first track will select the last track; rotating clockwise past the last track will select the first track
- If the drive is already in PLAY mode when the AMS control is rotated, playback of the new track will begin immediately
- From PAUSE, playback will be held in PAUSE at the start of the new track. Press **PLAY/PAUSE** to begin playback

The NEXT and PREVIOUS functions performed by the AMS control are also available from the RC-882 remote control with the ►► and ◀◀ buttons.

Note that the **AMS** knob is a multi-function control and it has several other uses, including menu navigation and MARK writing.

Fader

The **FADER** button can be used instead of the **PLAY/PAUSE** button to start and stop playback from (and recording to) the currently-selected drive, but with a controlled fade-in and/or fade-out of the audio. Fade-in and fade-out times are user-definable.

In disc playback the FADER function operates as follows:

- When the drive is in STOP mode, pressing the **FADER** button cues it to Track 1 and enters PLAY mode. The playback audio level fades up from zero to maximum over the time period defined as the Fade-in Time
- Pressing **FADER** while a disc is already playing (i.e. the drive is in PLAY mode) reduces the audio level from maximum to zero over the time period defined as the Fade-Out Time, and then puts the drive into PAUSE mode
- From PAUSE mode, a further press of **FADER** puts the drive back into PLAY, with the audio level fading up again

In disc recording modes, the FADER function operates as follows:

- Pressing the **FADER** button from RECORD PAUSE mode (see RECORD above) puts the drive into RECORD mode in the normal manner; recording starts, but the audio level fades up from zero to maximum over the Fade-in Time
- Once in RECORD mode, a further press of **FADER** reduces the audio level back to zero over the Fade-Out Time, and then puts the drive into RECORD PAUSE mode

The Fade-In and Fade-Out Times can each be set from 1 to 10 seconds (in 1 second increments) via the Menu system. See page 29 for full details.

Activation of the FADER function is indicated on the display by the flashing text **FADE-IN** or **FADE-OUT** while the fade is actually taking place.



Selecting an input

The CDR-882 is equipped with five stereo audio inputs, in various formats. Only one may be active at any one time, and provides the real-time recording or monitor source. In the case of DualBurn Record Mode (see page 39), the selected input is the source for both drives.

The currently selected input is indicated at the top left of the display at all times. The **I/P SELECT** button determines which input is to be used; pressing it scrolls through the five options in sequence, which are:

INPUT	DISPLAY
Balanced analogue (XLRs)	<i>Balanced</i>
Unbalanced analogue (phonos)	<i>Unbal</i>
AES/EBU digital	<i>AES/EBU</i>
S/PDIF (phonos)	<i>Coax</i>
S/PDIF (TOSlink)	<i>Optical</i>

See page 10 for details of the various rear panel connectors, pinouts and details of the inputs' capabilities.

Note that changing from one digital input type to another may require the selection to be confirmed with the **ENTER** button, which may affect the Clock Source. See page 38 for further details.

Time displays

The track or disc time information shown on the front panel display is determined both by the drive's current status and the selected **DISPLAY** option.

- When a disc is first loaded, the time display shows the total time of all the tracks on the disc (once disc initialisation is complete) – **TOTAL**
- When a disc has been cued to the start of a track (i.e. with the AMS knob), but is waiting in STOP or PAUSE modes, the duration of that track is displayed – **TRACK**
- While a track is playing, any of the four options listed below may be selected with the **DISPLAY** button

Pressing the **DISPLAY** button In PLAY mode scrolls through the options, which are (in sequence):

INPUT	DISPLAY
Elapsed time – track (+ track number)	TRACK
Elapsed time – whole disc	TOTAL
Remaining time – track (+ track number)	REMAIN
Remaining time – whole disc	TOTREM

Note (1): The **DISPLAY** button only alters the time display option for the drive currently selected by the **DRIVE SELECT** button (28).

Note (2): If PROGRAM PLAY mode is selected (see page 44), the times displayed in TOTAL and TOTREM modes are those for the programmed playlist, not the total of the disc.

The display indicates which method is currently selected (for each drive) to the right of the time display itself.

If a disc containing CD Text data is loaded, the display will automatically show the CD Text. Track number and time information may be displayed instead by pressing **DISPLAY**.

Monitoring

The CDR-882 is equipped with a comprehensive audio monitoring system, which includes the capability to monitor playback from one drive while recording from an external source on the other. (See page 18 for more information on simultaneous record and playback.)

The diagram below is a simplified depiction of the CDR-882's monitoring system.

CDR-882 Monitoring system

The operation of the monitoring system depends on the status of the two drives. The two input monitor switches in the diagram above are "virtual" switches, not direct representations of physical switches. Both are normally in "Off", passing the playback signal from the two drives to the Output and Phones Mixers. Input Monitor 1 will switch "On" when Drive 1 is put in RECORD, or if the front panel MONITOR function is selected. Similarly, Input Monitor 2 will switch "On" when Drive 2 is put in RECORD, or again, if the front panel MONITOR function is selected.

In the diagram, Input Monitor 1 is shown "Off" and Input Monitor 2 "On". This is the situation that would occur when Drive 1 is playing and Drive 2 is simultaneously recording from an external source. In this case, the two signals which are available to the Phones and Output Mixers are the playback signal from Drive 1 and the currently-selected input signal. These two signals may be selected individually by each Mixer, or a mix of both may be selected.

Note that if a drive is in PLAY, it latches the Input Monitor for that drive to OFF so that the playback audio is heard. Also, Input Monitor cannot be re-enabled whilst the drive is in PLAY.

The **MONITOR** LED indicates the status of the Input Monitor switches. If it is OFF, neither Input Monitor switches are active; if it is ON, then the Input Monitor for the currently selected drive (using **DRIVE SELECT**) is active; if it is flashing, then the Input Monitor for the other drive (i.e., the drive **NOT** selected using **DRIVE SELECT**) is active.

Main Outputs

The signal available at the CDR-882's rear output connectors may be the playback signal from, or the input signal to either drive, or a mix of these.

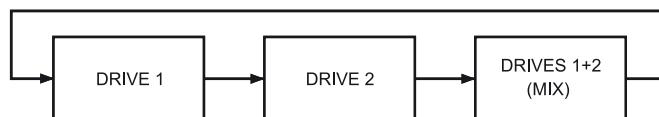
The output is determined by settings in the **Output Mix** submenu. Options are available here to audition either drive, whether in playback or record, or to hear a mix of the signals from both drives; see page 18 for full details. The default setting is **As Phones**, wherein the output selection is determined by the setting of the **Phones Mix** menu option (see below).

The CDR-882's input signal (as selected by the **I/P SELECT** button) may be routed to the outputs by pressing the **MONITOR** button*. Note that this selection will also affect the headphones output (see below).

Headphone Outputs

A front panel headphone socket is provided, whose monitoring source may be selected independently of the main outputs. As with the main outputs, the headphones may carry the playback signal from either drive, the input signal, or a mix of these.

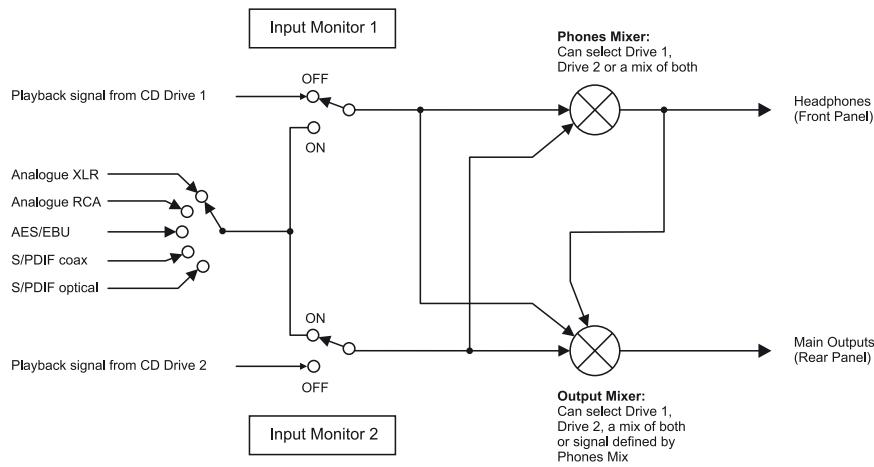
The playback signal heard at the headphones socket is primarily determined by the **PHONES SELECT** button, which scrolls through the three available options as follows:



The selected setting is indicated by the illumination of one or both LEDs above the **PHONES SELECT** button. In the case of the Mix option, what is heard in the headphones is determined by the option selected in the **Phones Mix** submenu. See page 30 for full details of the options available.

The CDR-882's input signal (as selected by the **INPUT SEL** button) may be routed to the headphones socket by pressing the **MONITOR** button*. Note that this selection will also affect the main output (see above).

* Note that this function is also available from the RC-882 remote control, with the **INPUT MONITOR** button.



Recording

In the CDR-882, CD recording may be carried out in either drive.

To record a single CD from an external source, insert a blank CD-R or CD-RW into a drive, selecting that drive if necessary with the **DRIVE SELECT** button. Ensure that the input being used is that selected by **I/P SELECT**. The **MONITOR** button may be used to audition the input signal.

- Analogue inputs: using the bargraph meters, set the record level with the **ANALOG REC LEVEL** control
- Digital inputs: additional record level adjustment is available via the menu system (see page 29)

Pressing **RECORD** will initialize the drive, with the display reading **Rec Setup** while this is taking place. The drive will then enter RECORD PAUSE mode, with the **PLAY/PAUSE** button flashing. The record process is then started by pressing **PLAY/PAUSE**.

Synchronised Recording

Using the **SYNC RECORD** button, it is possible to synchronise the start of a recording to an external trigger.

The source of the Start Trigger is selected via the menu system, at **Record > S/PDIF-i/p REC Start Trigger**. With **S/PDIF subcode** selected, a DAT or MD Start ID, or a CD track PQ code in the S/PDIF input bitstream will provide the trigger. This setting can only be used with an S/PDIF input.

With **Audio Threshold** selected, the trigger is generated by the audio level rising above a threshold also set in the menu system, at **Record > Audio Threshold**. This setting must be selected for all inputs other than S/PDIF (and is optional with S/PDIF).

Track ID Triggers cause a new track to be created on the disc. Their source is defined in a similar way to Start Triggers, at **Record > Auto Track ID Trigger**; in addition to **S/PDIF subcode** and **Audio Threshold**, there is a third option, **Time Interval**.

Synchronised Recording may be used to record just one track, or multiple tracks.

Note that it is possible to override Synchronised Recording by pressing **PLAY/PAUSE** at any time.

Record one track

To sync-record just one track at a time from an external source:

1. Set the **Record Sync** option in the **Record** submenu to **Rec Start/Stop**.
2. Ensure that the **S/PDIF-i/p REC Start Trigger** option is set according to the input being used, as described above.
3. Press the **SYNC RECORD** button. After a short setup period, the recorder will enter RECORD PAUSE mode, and wait for a Start Trigger of the type selected. The display will show **Sync-1**.
4. On receipt of a trigger, the CDR-882 will start recording.
5. On receipt of a second trigger, the recording will enter RECORD PAUSE mode. This second trigger may be another DAT/MD Start ID, a CD track or End PQ code or 5 seconds of digital silence (in the case of S/PDIF subcode), or, if **Audio Threshold** was set, the input signal level dropping below the preset threshold for 5 seconds.

6. Press **STOP** to end the recording (the display will show **Close Track**). If you wish to sync record additional tracks, press **SYNC RECORD** again; the process will repeat from Step 3.
7. Note that if the disc becomes full, no further recording is possible and recording will stop.

Record multiple tracks

To sync-record multiple tracks from an external source:

1. Set the **Record Sync** option in the **Record** submenu to **Rec Start/Stop + Track**.
2. Set the Track ID trigger to be either **S/PDIF subcode** or **Audio Threshold** as described above. Note that the Track ID trigger source can be different from the selected Start Trigger.
3. Press **SYNC RECORD**. After a short setup period, the recorder will enter RECORD PAUSE, and wait for a Start Trigger. The display will show **Sync-All**, or **Sync-F** if Auto-Finalise is enabled (see below).
4. On receipt of a trigger, the CDR-882 will start recording.
5. On receipt of a second and subsequent triggers, a new track will be created, the track number shown on the display will increment by one and the track time will reset to 00:00.
6. The recording will re-enter RECORD PAUSE if either of the following conditions is detected:
 - a) A period of digital silence lasting 5 seconds.
 - b) The audio input level drops below the audio threshold for 5 seconds (when **Audio Threshold** is set as the selected Track ID trigger source).
7. Note that if the recorder detects a subsequent external trigger, the recording will re-start, with a new track being created.
8. If **S/PDIF subcode** is set as the Track ID Trigger source, the recording will end and the drive will enter STOP mode on receipt of a CD End PQ code. Finalisation will then start immediately if **Auto-Finalise** is set to **On** (see below)
9. Press **STOP** to end the recording manually.
10. Note that if the disc is full, no further recording is possible and recording will STOP.

Finalisation in Synchronised Recording

1. IF **Auto Finalise** is set to **On**, then at the end of a Synchronised Recording, the disc will be finalised automatically, after which no further recording will be possible.
2. This process will start one minute after the recording has entered RECORD PAUSE if there is no further detection of an external trigger.
3. If the trigger to end the recording was a CD End PQ code, the finalisation process will not wait for one minute, but will start immediately (see Step 8 above).
4. If the recording ended because the disc was full, then Auto-Finalisation will begin immediately
5. Auto-Finalise does not function at the end of recordings where automatic Track ID insertion did not take place (i.e., the example "Record one track" above), except where the disc was full.

Time Interval track ID generation

If **Time Interval** is selected as the **Auto Track ID Trigger** source, Synchronised Recording will continue as if **Record Sync** was set to **Rec Start/Stop** only. New tracks are created at regular time intervals, as set at **Record > Track Length**.

Automatic and Manual track IDs

During recording, Track IDs may be set either manually or automatically; AUTO or MANUAL operation is selected with the **ID AUTO/MAN | AUTO-CUE** button [21]. The selection is confirmed on the bottom line of the display by **ID:MANUAL** or **ID:AUTO**. Note that the **ID AUTO/MAN | AUTO-CUE** button only performs this function in RECORD mode; in all other drive modes it acts as the **AUTO-CUE** button.

In **MANUAL** mode, Track IDs are inserted manually during recording by pressing the **ID WRITE | CUE** button (22). As the Track ID is written, the **ID:MANUAL** flag in the display flashes. Note that the minimum permissible length of a track is 4 seconds; it is not possible to have Track IDs closer together than this. Note that the **ID WRITE | CUE** button only operates in RECORD mode; in all other drive modes it acts as the **CUE** button.

In **AUTO** mode, Track IDs are inserted automatically under the conditions outlined in the previous manual section.

NOTE: that Red Book limitations limit the number of tracks that a CD may have to 99. This number is reduced slightly when DiscSpan mode is in use.

Finalising

After recording, a CD-R or CD-RW must be finalised for it to be playable on a normal CD player. (However, note that not all CD players will play CD-RWs). The finalisation process writes the TOC (Table of Contents) to the disc, and after this point, no further tracks can be added to a CD-R, nor can any further editing of CD Text be made. However, a CD-RW can be "unfinalised" subsequently to permit deletion and/or further tracks to be added.

It is possible to remove the disc and record further tracks on it at a later time, finalisation being carried out when all tracks have been recorded. It is also possible to replay an unfinalised CD-R or CD-RW disc in the CDR-882, even though such discs will not play in a standard CD player.

Note that if the disc is ejected before finalisation, any CD Text entered will be lost.

The CDR-882 finalises discs either manually or automatically. Selection of manual or automatic finalisation is made via the menu system; see page 34.

If manual finalisation is selected (the default), the **FINALIZE** button should be pressed at the end of recording to initiate the finalisation process. The display will show **Finalize?** in the line for the drive being used; to start finalisation, press the **ENTER** button (the AMS rotary control). The display changes to **Finalizing**.

If automatic finalisation is selected, the disc will be finalised after recording stops, with no further user intervention required. Note that it is not necessary to select automatic finalisation when DiscSpan modes are in use; a disc is automatically ejected in a ready-to-play state during sequential recording.

Note that the time taken for finalisation is variable, and dependent upon the speed of the media.

Once a CD-R has been finalised, the disc type indication in the display will change from **CD-R** to **CD**, confirming that no further recordings can be made on the disc. This is not the case with CD-RWs, as they can always be rewritten.

WARNING: Never switch off the CDR-882 while finalisation is in progress, as the disc may become unusable.



Recording on CD-RWs

A CD-R can have additional tracks added after recording has finished, but before finalisation. It is not possible to delete tracks from a CD-R, once recorded; neither is it possible to add any further tracks to a CD-R after finalisation.

On a CD-RW, tracks may be overwritten. The CDR-882 provides the means to delete certain tracks from a CD-RW (there are restrictions – see page 47). Like a CD-R, further tracks can be added to a CD-RW before finalisation, but unlike a CD-R, a CD-RW may also be "unfinalised" after finalisation has taken place, and tracks deleted and/or added.

The basic process of recording a single CD-RW is essentially no different from recording a CD-R. The display will confirm that the disc is a CD-RW once a disc is inserted. If there is already programme material on the disc, the number of tracks will be displayed; once **RECORD** is pressed and the drive enters RECORD PAUSE mode, the track counter will increment by one, ready for the addition of the new track(s).

Disc types

CDs are recorded to CD-DA Red Book standard in the CDR-882 DualBurn Recorder using either CD-R (write once) or CD-RW (rewriteable) blank discs. Blank discs optimised for audio use are recommended for professional use, though the CDR-882 will accept standard "data" CD-Rs and CD-RWs as well.

HHB blank recordable media is recommended for high quality audio, as it is manufactured specifically for professional audio applications. The CDR80HS 52x disc is particularly suited to the high-speed drives in the CDR-882.

The CDR-882 is also able to play and record audio CDs with "encoded" formats such as Dolby Digital or DTS. No audio decoding for these formats is provided on replay, however the Dolby Digital or DTS bitstream is available in full at the digital outputs. Recording of such formats is possible either by using DISC COPY mode, or by connecting a Dolby Digital, DTS, etc., digital input signal externally. (Sample rate must be 44.1kHz and Input Dither should be disabled with such signals; see page 30 for more information about setting Input Dither.)

It may be possible to play discs which include non-audio content as well as audio; an example is CD+graphics. However, if the CDR-882 is used in DISC COPY mode with such discs, only the audio content of the source disc will be copied. Discs with CD Text content are fully supported by the CDR-882, however.

The CDR-882 only plays and records audio discs; other CD formats, for example computer CD-ROMs, cannot be played or recorded. No support is provided on playback or record for MP3, WMA, AAC, etc. files

Digital Recording restrictions

Almost all commercial digital source material is protected by copyright laws, and many CDs use copy control flags to limit digital recording of a source to one generation only. However, as the CDR-882 is a professional recorder the status of the copy control flag is ignored, and the status of the flag written to disc is adjustable.

This facility is only for professional use and must never be used to enable infringement of copyright.

The maximum number of tracks which can be recorded to a CD is 99.

The minimum allowable length of a individual track is 4 seconds.

Track numbers are automatically recorded to a CD along with the audio data, and incremented at the start of each track. The CDR-882 is able to create new tracks in several ways, based on IDs in the incoming digital audio (S/PDIF only), audio threshold, fixed time increments (useful when recording a long single programme), or manually. See page 33 for more details on how selection of the various options is made.

If recording digitally from a DAT machine some problems may be encountered as to the location of track numbers relative to the start of a track. In some cases, the start of a track may not be recorded, or the beginning of the subsequent track may be recorded on the end of a track. These anomalies are inherent in the DAT system and are a consequence of the accuracy achievable for inserting IDs into the DAT format using a DAT recorder's Auto ID function. To avoid these problems, we recommend that Start IDs are inserted manually on the DAT tape whenever possible.

Menu System

The CDR-882 has been designed to enable most of its basic functions and features to be actioned from dedicated front panel controls, without recourse to the display-based menu system. However, numerous additional settings and features are available from the system's submenus.

The menu system follows a conventional "tree" structure, with various submenus being available from the "top" level of the menu "tree".

Note that several of the CDR-882's front panel buttons are inoperative while the unit is in menu mode. These are:

- TEXT
- DISPLAY
- DISC COPY
- PROGRAM
- FINALIZE
- ERASE
- TRACK ID AUTO/MAN
- SYNC REC

All other front panel controls remain operative in menu mode.

Menu Navigation

The menu system is entered by pressing the front panel **MENU** button [16]. The display changes to show the submenu selected. If the menu system has not been previously accessed since the unit's last power-down, the first submenu, **AUDIO** is selected; otherwise the menu tree is "entered" at the last selected location.

The name of the submenu is highlighted; alternative submenus may now be selected by rotating the AMS control. Pressing **ENTER** (the AMS knob) selects the one required. The highlight then moves to the name of the setting or parameter for adjustment. A further press selects the parameter value itself, and rotating the AMS knob alters the value. In most cases, the displayed value flashes when the value is changed to indicate that it differs from the currently set value. Pressing **ENTER** at this point sets the new value, which is now displayed steadily. The CDR-882 stores all menu settings in non-volatile memory (unless otherwise stated below), thus they retain their values when the unit is powered off.

Note that there is only one "level" of parameters within each submenu.

MENU may be pressed at any time to return "back up" the menu tree, thus from parameter adjustment level, three presses are required to exit the menu system and return the display to normal operation.

NOTE: Menu navigation may also be performed from the remote control handset. The four buttons in the MENU/DIGITAL RECORD LEVEL area of the handset are used as follows:

- The ON/OFF button is equivalent to the front panel **MENU** button
- The ENTER button is equivalent to the press function of the AMS control
- The + and - buttons are equivalent to rotating the AMS control clockwise and anticlockwise respectively

Example

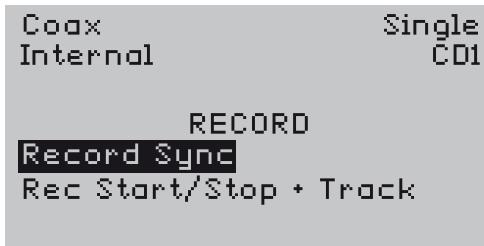
An example will illustrate the method of navigation. Suppose we want to adjust the sensitivity of audio threshold detection. (This determines the level above which the audio input signal must rise for synchronous recording to start and below which it must drop for a new track ID to be written – assuming the option is selected otherwise). We will assume this is the first time the menu system has been accessed since the last power-down.

Audio threshold adjustment is made from within the **RECORD** submenu.

- From the normal operating mode, press **MENU**. The display changes to the entry point of the first submenu, **AUDIO**



- Rotate the **AMS** control clockwise to show the other submenus until **RECORD** is displayed (highlighted). Press **ENTER** to select it



- Rotate the **AMS** control clockwise until the required parameter, **Audio Threshold**, is displayed (highlighted). Press **ENTER** to select it



- The **AMS** control may now be used to change the Audio Threshold level from -72dBFS (the factory default value) to a new level. The parameter value starts flashing as soon as the **AMS** control is moved to indicate that the value has been changed from the previous value
- Press **ENTER** again to select the new value
- Press **MENU** once to select a different parameter for adjustment within the **RECORD** submenu, twice to select a different submenu or three times to exit the menu system altogether

The Submenus

The CDR-882 menu system has eight submenus. These are as follows:

Submenu	Permits adjustment of
AUDIO	Input levels, fade times, input and output dither and monitoring options
CLOCK	Clock source selection
DISPLAY	Display contrast and backlight
EDIT MARKER	Marker positions, Auto-Cue threshold
DISCSPAN	Multi-machine operating options
RECORD	Record Sync & S/PDIF subcode options, Audio Threshold level, other record options
PARALLEL PORT	Allocation of parallel port connector to various CDR-882 functions
GENERAL	Timer and Eject inhibit options
FIRMWARE	Displays current firmware information

The options available within each submenu are described below.

Audio Submenu

There are seven parameters/settings for adjustment within the AUDIO submenu. They are in turn:

Digital Input Level



This permits adjustment of input level for the digital inputs, so that digital input signals with particularly high or low levels can be trimmed.

The digital input level can be set independently for each digital input type, AES/EBU, S/PDIF (Coax) and S/PDIF (Optical). The adjustment applies to the currently-selected input, and is saved for that input on exiting the menu. Note that **I/P SELECT** remains operative while menu mode is selected.

If an analogue input is selected, no adjustment is possible and the display shows **00.0 dB**.

It is adjusted in steps of 0.5dB between -12 and +12dB, and in larger steps outside of this range. The factory default value is 0dB for all three digital inputs.

Input Balance



This allows adjustment of the relative levels of the left and right inputs.

Input balance can be set independently for each of the five inputs. Balance between channels is achieved by reducing the level of one channel rather than adding gain to the other. The range of adjustment is 0 to -10dB for each channel, i.e. from L at 10dB below R through to R being 10dB below L. Note that this is a balance adjustment rather than a pan control – it is not possible to turn either channel right down to zero.

Fade-in Time

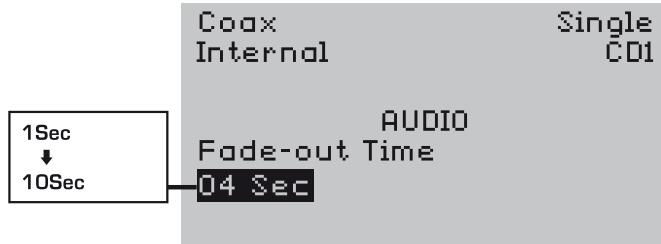


This parameter sets the fade-in time applied when the front-panel **FADER** button is used to fade the playback or record levels up from zero. Adjustment is available in 1 second increments from 1 to 10 seconds.

The factory default setting is 4 seconds.

See page 15 for more details about the CDR-882's FADER function.

Fade-out Time

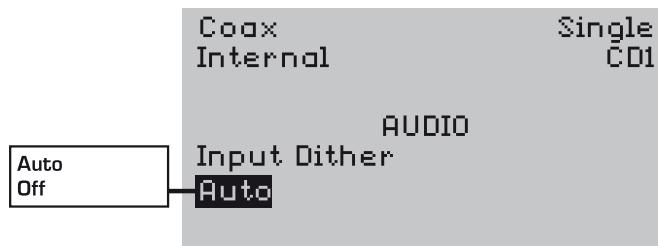


This parameter sets the fade-out time applied when the front-panel **FADER** button is used to fade the playback or record levels down to zero. Adjustment is available in 1 second increments from 1 to 10 seconds.

The factory default setting is 4 seconds.

See page 15 for more details about the CDR-882's FADER function.

Input Dither



The CDR-882 adds dither to some input signals to produce 16-bit samples suitable for recording onto a CD.

Analogue inputs always have dither added to the 24-bit output from the A-D converters.

If an AES/EBU or S/PDIF input signal has its channel status bits set to indicate a true 16-bit signal, dither will not be applied, and the Input Dither option will not be selectable. However, dither may be applied to 20-bit or 24-bit digital input signals at the user's discretion.

The two settings for the Input Dither option are **Auto** and **Off**. The default setting is **Auto**, thus dither will be automatically applied to digital input signals with more than 16 bits.

Note that the Input Dither setting cannot be changed while the CDR-882 is in RECORD mode.

Note also that no dither should be added to encoded bitstreams such as DTS, Dolby E, Dolby Digital or HDCD as it would destroy their data formats. Detection of such bitstreams will, in most cases, be automatic and will ensure that Input Dither is selected **Off**. However, there may be situations where the formats are not automatically detected; in these cases, the user should set Input Dither to **Off** manually.

Phones Mix



The **Phones Mix** menu option allows the user to define how the headphone monitoring operates when the front panel **PHONES SELECT** button is set to "Drive 1 + Drive 2" (see page 14).

Priority can be assigned to one or other of the drives. The signal from a drive will be the playback audio if the drive is in PLAY mode, or the currently-selected input signal if the drive is in RECORD mode, or if the front panel **MONITOR** button [18] is pressed.

Four options are available:

Option	Phones operation
Priority CD1	If both drives have an active signal, only that from Drive 1 is heard
Priority CD2	If both drives have an active signal, only that from Drive 2 is heard
1+2	The signals from both drives are mixed together
1+2 (-6dB)	The signals from the two drives are mixed together, but reduced in level by 6dB

The factory default setting is **1+2**.

Output Mix



The **Output Mix** menu option allows the user to set the output mix routed to the rear panel audio outputs. Priority can be assigned to one or other of the drives. The signal from a drive will be the playback audio if the drive is in PLAY mode, or the currently-selected input signal if the drive is in RECORD mode, or if the front panel **MONITOR** button [18] is pressed.

Five options are available:

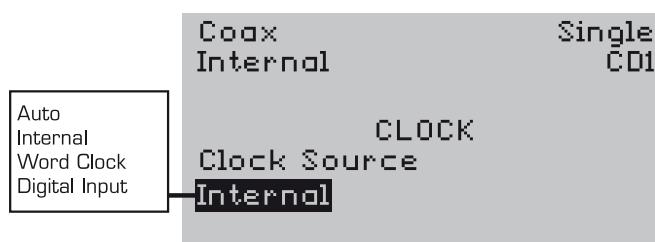
Option	Phones operation
Priority CD1	If both drives have an active signal, only that from Drive 1 is heard
Priority CD2	If both drives have an active signal, only that from Drive 2 is heard
1+2	The signals from both drives are mixed together
1+2 (-6dB)	The signals from the two drives are mixed together, but reduced in level by 6dB
As Phones	The output sockets will carry the same signal as that at the front panel headphones socket, as determined by the PHONES SELECT button and Phones Mix menu setting

The factory default setting is **As Phones**.

Clock Submenu

The Clock submenu has only one option for adjustment.

Clock Source



By default, selection of word clock source is automatic, the preferred source being dictated by the input source selected. However, it is possible to "force" the selection of a particular clock source.

Four options exist in the menu for Clock Source:

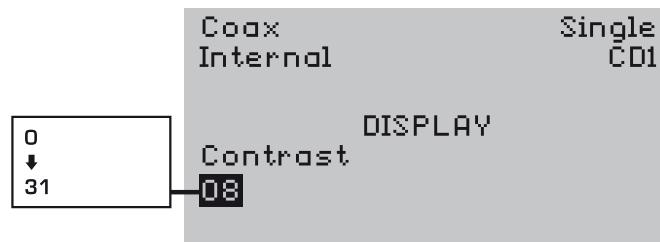
Option	Clock Source
Auto	Clock source is selected automatically depending on input signal type. This is the default setting.
Internal	Selects the internal clock; if a non-synchronous digital input is used, it will be sample rate converted to the internal clock frequency.
Word Clock	Selects the external Word clock input (see page 11). Also see note below.
Digital Input	Uses the selected digital input as clock source; if an analogue input is currently selected, the last-selected digital input is used. Also see note below.

Note that it is not possible to select the **Clock Source** menu option while the recorder is in RECORD mode.

Display Submenu

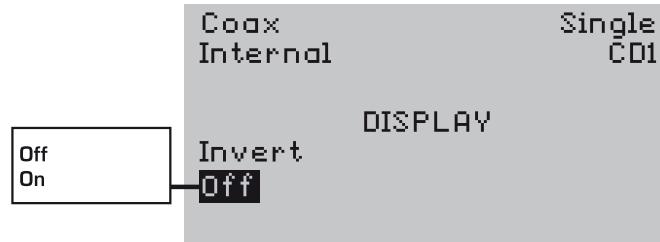
Two parameters of the LCD display itself are available for adjustment in the **Display** submenu.

Contrast



A wide range of display contrast adjustment is provided (30 increments), to suit various ambient light levels and viewing angles.

Invert



Under some extreme conditions a better display image may be obtained with the video reversed (i.e blue on a white background instead of white on blue). The Invert setting can be set to **On** to achieve this.

Edit Marker Submenu

The Edit Marker submenu allows adjustment of two parameters.

Direct Mark



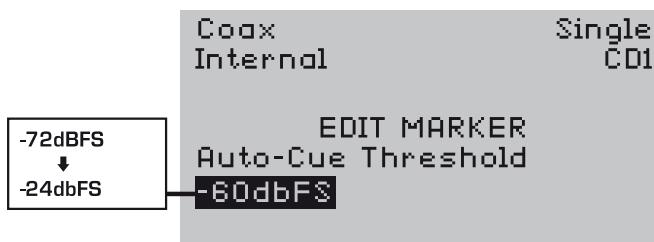
It is not always possible to capture a cue point with the necessary accuracy. Once a Marker point has been created (by pressing **ENTER** during PLAY mode), its position may be edited with frame accuracy.

The **Direct Mark** option in the **Edit Marker** submenu displays the stored location of the cue point, as in the example above. The first digit is the drive number (1 or 2) and the next three characters (nnt) the track number. The remainder of the data is the track time in minutes, seconds and frames.

Pressing **ENTER** to select the displayed location (the bottom row of the menu display) first highlights the drive number; subsequent presses highlight the track number, minutes, seconds and frames in turn. At each step, the **AMS** control may be rotated to alter the selected element of the cue point location.

Audio preview is available from within this menu option by pressing the front-panel **CUE** button; this enables the edited cue position to be auditioned without exiting the menu.

Auto-Cue Threshold



Cueing to a track start point with the **AMS** control is often insufficiently accurate, as a period of silence may be present on the disc before the programme material begins. The CDR-882's Auto-Cue function can be used to cue more accurately; it effectively removes any period of silence that might be present at the start of the track.

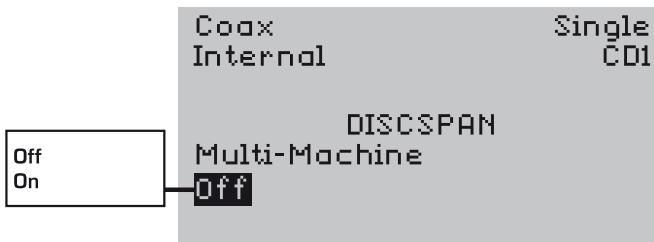
With **AUTO-CUE** selected on the front panel, the cue point is advanced beyond the notional track start point to the point at which the audio level rises above a preset threshold, ensuring that programme plays immediately on pressing the **PLAY/PAUSE** button.

The audio level which defines the Auto-Cue point can be set in the **Auto-Cue Threshold** menu option. It is adjustable from -72dBFS to -24dBFS in 6dB increments.

DiscSpan Submenu

The **DiscSpan** submenu has five parameters for adjustment.

Multi-Machine



This option simply allows activation of the CDR-882's multi-machine mode, and has two options, **On** and **Off**. The factory default setting is **Off**. This option needs to be set to **On** if additional CDR-882's are connected to the unit's RS232 Link Output port to increase recording capacity.

Note that this submenu will not be available if no additional machines are connected.

Master/Slave



In a multi-machine set-up, only one machine can be designated the Master, and this controls any other machines connected to it - the Slaves - through the RS232 Link Output port.

Whether a particular unit is the Master or a Slave is set at the Master/Slave menu option. The two settings are simply **Master** or **Slave**. The factory default setting is **Master**.

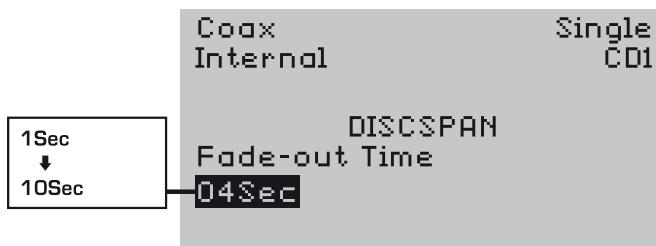
Note that this submenu will not be available if no additional machines are connected.

Fade-in Time



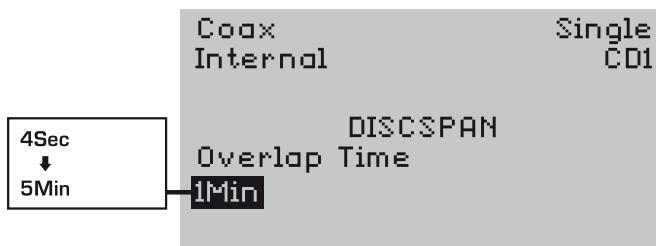
In **DiscSpan** modes, the audio record level for each disc is faded up at the start of the disc, as recording is "handed over" from one drive to the other. The length of this fade-in is adjusted in this menu option, and can be from 1 to 10 seconds, adjustable in 1 second increments. The factory default value is 4 seconds.

Fade-out Time



This is the corresponding fade-out time, which sets the duration of the fade down at the end of one disc, as recording passes to the other drive. The length of fade-out can be from 1 to 10 seconds, adjustable in 1 second increments. The factory default value is 4 seconds.

Overlap Time



In **DiscSpan** modes, the input signal feeds both the CDR-882's drives; a few seconds before recording stops on one disc, the other starts recording so that for a short time both drives are recording. Thus there are a few seconds of audio duplicated, at the end of one disc and at the start of the next. This allows recordings to be seamlessly re-assembled on playback in the CDR-882 or on a workstation editor.

The CDR-882 is able to replay discs which have been recorded sequentially in this way "seamlessly", using the overlap period to fade from one drive to the other so the audio output is continuous. See page 39 for more information on DiscSpan operation.

The duration of the overlap is adjustable from 4 seconds to 5 minutes. The increments are 5 seconds for durations of up to 30 seconds, and 30 second increments thereafter. The factory default value is 1 minute.

Record Submenu

The **Record** submenu has nine parameters available for adjustment.

Record Sync

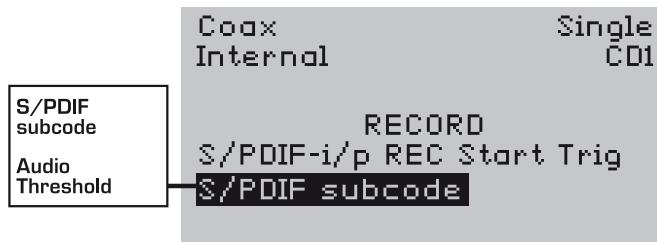


This option determines whether the CDR-882 increments the track counter on receipt of Track IDs. The two settings are **Rec Start/Stop** and **Rec Start/Stop + Track**.

If **Rec Start/Stop** is selected, reception of a track trigger (sub-code or audio threshold) starts recording. Recording stops when either a DAT End ID or other stop ID is received via S/PDIF, or after 10 seconds of digital silence.

If **Rec Start/Stop + Track** is selected, in addition to the above, a new track marker is written to the disc every time a new track trigger is received, and the track counter increments by one. (This is the default setting)

S/PDIF-i/p REC Start Trigger

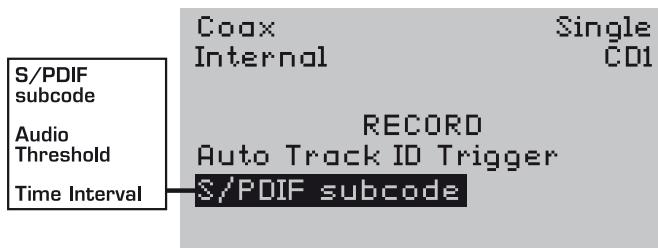


This option is used to determine the source of record start triggers. The two settings are **S/PDIF subcode** or **Audio Threshold**.

With **S/PDIF subcode** selected, record start triggers are derived from DAT/MD Start IDs or CD PQ codes within the S/PDIF input bitstream. Note that the S/PDIF input must be selected as the active input for **S/PDIF subcode** to be a valid selection.

With **Audio Threshold** selected, a record start trigger is generated when the input signal level rises above a preset threshold (see page 34) for the first time after the selected drive has been placed in RECORD PAUSE mode. This setting is only one that can be used with any input other than S/PDIF, and is the factory default.

Auto Track ID Trigger



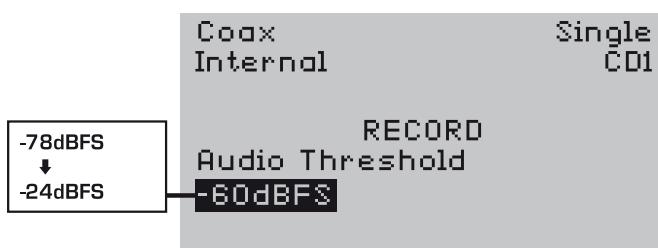
This option is used to determine the source of track ID triggers, i.e. what defines that a new track should commence on the disc being recorded. There are three possible settings: **S/PDIF subcode**, **Audio Threshold** or **Time Interval**.

If **S/PDIF subcode** is selected, a new track is created when a DAT/MD Track ID or CD PQ code is received in the incoming S/PDIF input. If this option is selected when an input other than S/PDIF is that currently selected, the Track ID source will change to **Audio Threshold** (see below).

With **Audio Threshold** selected, a new track is created when the level of the audio input signal drops below the level set as the Audio Threshold for more than 2 seconds.

If **Time Interval** is selected, a new track is created at fixed time intervals, regardless of the input signal. The length of the interval (and hence the track length) is set in the **Track Length** menu option (see below). This setting may be useful if the CDR-882 is being used to record lengthy programme material without obvious breaks (such as a speech or conference).

Audio Threshold



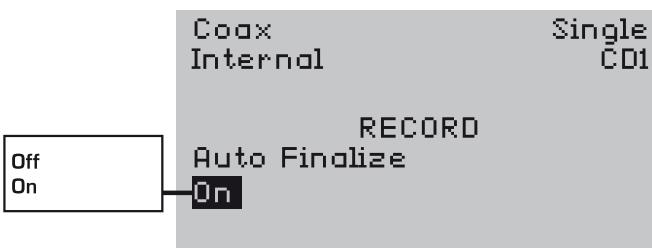
This menu option sets the audio threshold level used to create Rec Start or Track IDs, if **Audio Threshold** has been set as the source for **Record Start Triggers** (above) or **Auto Track ID Triggers** (also above). The threshold is adjustable in 6dB increments from -78dBFS to -24dBFS. The factory default value is -60dBFS.

Track Length



This sets the length of tracks when **Time Interval** is selected in the **Auto Track ID Trigger** menu option. A new track is created regardless of input signal at the time interval specified in this option. The track length is adjustable in 1 minute increments from 1 minute to 10 minutes.

Auto Finalize



This menu option determines whether disc finalisation is performed automatically when all tracks have been recorded, or needs to be initiated manually (using the front panel **FINALIZE** button). Auto Finalize may be set **Off** or **On**.

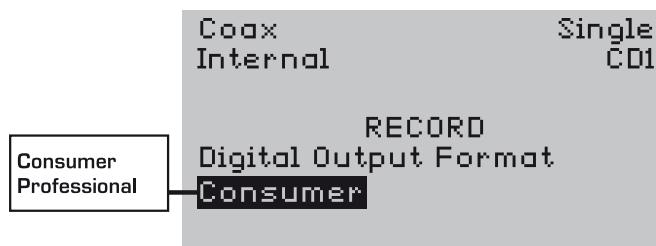
Automatic finalisation is also dependent on the use of the CDR-882's SYNC RECORD function. With **Auto Finalize** set **On** and SYNC RECORD selected, finalisation will be carried out automatically at the completion of a sync recording.

If SYNC RECORD is not selected, automatic finalisation will only be performed when the disc is full.

With Auto Finalize set **Off**, the user must press the front panel **FINALIZE** button to start the finalisation process.

Note that **Auto Finalize** is selected automatically in DISCSPAN mode in order that ready-to-play discs are available immediately recording is complete. With the DISC COPY function, discs are always finalised, so this submenu setting is not relevant. See page 39 and page 41 for more information on these modes).

Digital Output Format



This sets the format of the channel status block in the digital output bitstream to be "professional" or "consumer".

With the professional setting, the digital output bitstream conforms to AES3-1992 (r1997) amendment 4-1999 (generally referred to as AES/EBU). With the consumer setting, the output bitstream conforms to IEC60958 (generally referred to as S/PDIF). The factory default setting is **Consumer**.

It is important to appreciate that in the CDR-882 a bitstream conforming to either AES/EBU and S/PDIF standards is available simultaneously at all digital outputs, i.e., all three digital outputs carry the same format at all times.

Setting the **Digital Output Format** menu option to **Professional** or **Consumer** merely changes the channel status block format between "professional" and "consumer", as might be required by other equipment. There is no difference in the audio part of the bitstream at the outputs. However, note that only the S/PDIF consumer format carries CD Text data and Track IDs.

SCMS



The **SCMS** (Serial Copy Management System) menu option determines how the SCMS copyright flag is set on the disc being recorded. There are three settings available for the SCMS flag, **Prohibit Copy**, **Copy Once** or **Permit Copies**.

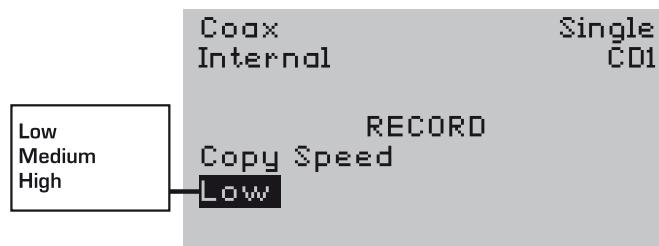
With the SCMS set to **Prohibit Copy**, it will not be possible for any further digital copies of the disc to be made.

If the option is set to **Copy Once**, a digital copy of the disc can be made, but it will not be possible to make any further digital copies from that copy.

With **Permit Copies** set, there are no restrictions on making digital copies of the disc.

Note that it is not possible to change the SCMS setting while the CDR-882 is in RECORD mode. See page 48 for further information on SCMS.

Copy Speed



The CDR-882's DISC COPY function permits CDs to be copied at high speed. Different media have different optimum write speeds. This menu option lets the user set a copy speed to optimise the performance for the disc type in use.

One of three copy speeds may be set, **Low**, **Medium** or **High**. The factory default setting is **Low**.

Broadly, **Low** corresponds to up-to-8x normal speed; **Medium** to 12x to 16x normal speed and **High** to 24x to 52x normal speed. The precise copy speed will be determined by the speeds supported by the media and the drives.

Note that if the destination disc is a CD-RW, the setting of this menu is ignored since CD-RWs have very specific write speed requirements, which are set automatically.

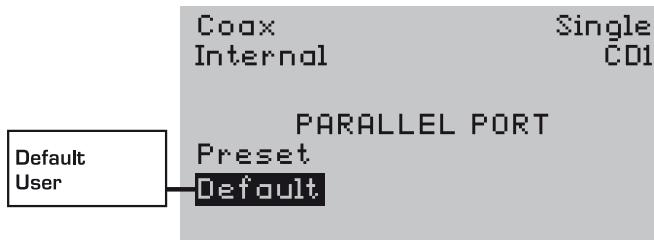
The Copy Speed setting only applies to DISC COPY mode, not other recording modes.

Parallel Port

The **Parallel Port** submenu permits the user to reprogram the pin assignment of the rear panel parallel control port, with the constraint that the port always provides five inputs and three outputs (tallies). The CDR-882 has a factory default pin assignment, full details of which can be found at page 49. This default assignment can be reinstated at any time with the first submenu option, **Preset**.

There are a total of nine menu options within the **Parallel Port** submenu, one to select the default (or not), and one for each of the eight control inputs/tallies.

Preset



This menu option has two settings, **Default** and **User**, which may be considered as two memories. **Default** always contains the factory assigned pinout (see page 49), selecting **Default** assigns this to the Parallel Port connector. If **User** is selected, the pinout applied is that which has been set up in the remaining submenu options listed below. The factory default contents of the **User** memory is the same as that of the **Default** memory. **User** must be selected to reassign any (or all) of the inputs and/or outputs.

Inputs 1 to 5



The next five submenu options allow the functions of the five Parallel Port inputs (pins 1-5) to be reassigned. The five options are identical in operation.

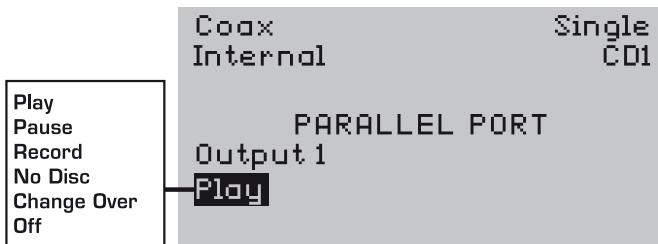
There is a "menu" of nine transport commands (including **OFF** – i.e. no assignment), from which any five may be programmed onto the five input pins of the Parallel Port connector. These are as follows:

Function	Default Assignment
PLAY/PAUSE	Input 1
RECORD	Input 2
STOP	Input 3
AMS +	Input 4
AMS -	Input 5
FFWD	Not assigned
FREW	Not assigned
EJECT	Not assigned
OFF	Not assigned

To assign a different transport command to one of the inputs, rotate the **AMS** control to display the input (Input 1 to Input 5), press **ENTER** to select it. The transport function may then be selected from the list now viewable on the bottom row of the display by rotating the **AMS** control. Press the **ENTER** button again to make the assignment.

The **Preset** submenu option above must be set to **User** before any of the **Input** menu options can be selected.

Outputs 1 to 3



The remaining three submenu options allow the functions of the three Parallel Port outputs (pins 7-9) to be reassigned. The three options are identical in operation.

There is a "menu" of six transport tallies (including **OFF** – i.e. no assignment), from which any three may be programmed onto the three output pins of the Parallel Port connector. These are as follows:

Function	Default Assignment
PLAY	Output 1
PAUSE	Output 2
RECORD	Output 3
NO DISC	Not assigned
CHANGE OVER*	Not assigned
OFF	Not assigned

* In DiscSpan mode, CHANGE OVER indicates a new disc may be inserted.

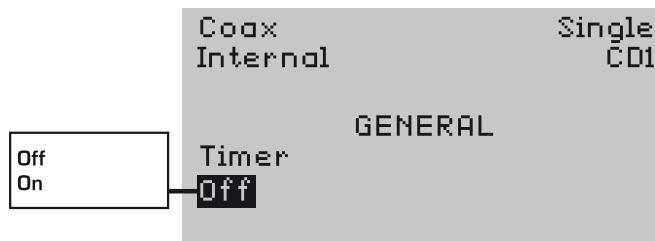
To assign a different tally to one of the outputs, rotate the **AMS** control to display the output (Output 1 to Output 3), press **ENTER** to select it. The transport function may then be selected from the list now viewable on the bottom row of the display by rotating the **AMS** control. Press the **ENTER** button again to make the assignment.

The **Preset** submenu option (above) must be set to **User** before any of the **Output** menu options can be selected.

General Submenu

The **General** submenu has two settings available for adjustment.

Timer

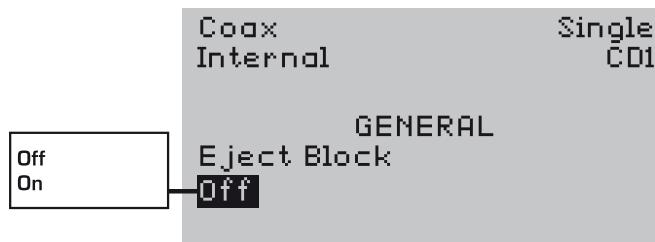


The CDR-882 has a Timer function which, when enabled, causes the CDR-882 to enter PLAY mode when the power is applied. Thus, by leaving the (mechanically-latching) power switch ON, the CDR-882 can be used to start playing a pre-loaded disc (or discs) when external power is applied via a time-controlled switch of some description.

The submenu option can simply be set to **On** or **Off**. The factory default setting is **Off**.

With the Timer function enabled, the CDR-882 first goes through its usual power-up diagnostic routines when power is applied. The drive containing an audio disc then enters PLAY mode; if both drives have discs, that in Drive 1 will be played. The CDR-882 also restores its MODE setting at the last power-down - i.e. Single, DualBurn or DiscSpan. Thus if DiscSpan mode is set, discs in the two drives will play in sequence.

Eject Block



The EJECT function is disabled if the selected drive is in either RECORD or RECORD PAUSE mode, to prevent inadvertent disc ejection and consequent recording abort. It is possible to additionally disable EJECT from all modes other than STOP, thereby guarding against the possibility of a disc being ejected while it is playing.

The submenu option can simply be set to **On** or **Off**. With the option set to **Off**, EJECT is only disabled in RECORD and RECORD PAUSE modes. When **On**, the selected drive must be in STOP mode for the EJECT function to work. The factory default setting is **Off**.

Firmware Submenu

The Firmware submenu displays the version numbers of the various firmware files within the CDR-882. The user need not concern him/herself with these, but they may be useful to HHB's Technical Support engineers should a problem arise with the unit.

No adjustments are available within this submenu.

CDR882 Firmware Version

Displays the version number of the CDR-882's main operating system, and date.

Drive 1 Firmware Version

Displays the version number of Drive 1's internal firmware.

Drive 2 Firmware Version

Displays the version number of Drive 2's internal firmware.

CPLD Firmware Version

Displays the version number of the CDR-882's Complex Programmable Logic Device.

Advanced Features & Operation

Internal & External Clocks

Word clock in the CDR-882 can be obtained from several sources. An internal crystal oscillator is provided, which is the preferred source for use with analogue input signals. When digital input signals are used, the word clock may be extracted from the AES/EBU or S/PDIF bitstreams themselves. A further option is to use a separate external clock signal.

In many professional digital audio systems, a separate external master clock is used to synchronise all digital audio equipment in the system; the CDR-882 is provided with an external word clock input for use in such a situation.

Clock selection in the CDR-882 is normally automatic, the source being selected to suit the audio input being used. The following rules apply to the automatic selection system:

- If an analogue input (**Balanced** or **Unbal**) is selected, the CDR-882's own internal clock will be used
- If a digital input (**AES/EBU**, **S/PDIF Coax** or **Optical**) is selected, the signal itself will be used as the clock source, as long as it is within the acceptable frequency range, namely 44.1kHz +/-100ppm
- If a digital input is outside this range the internal clock will be used, and the input signal sample rate converted to the internal clock frequency

The choice of the internal clock for analogue inputs or the embedded word clock for digital inputs will give perfectly satisfactory results in most recording situations. However, it is possible to override the automatic selection described above and use a different word clock source.

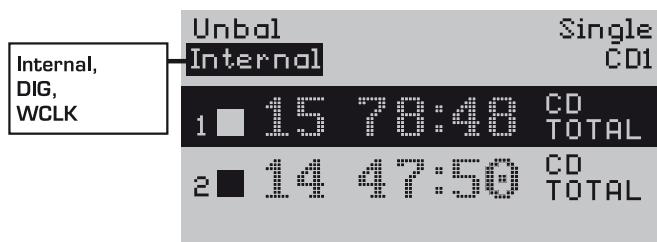
The Clock submenu is used to select a different word clock source from that chosen automatically. See page 31 for full details.

Overriding the automatic selection allows the user to:

- Use either an external master studio clock or a digital audio signal (AES/EBU or S/PDIF) as word clock source when using analogue inputs. This may be desirable for all but the simplest digital audio systems as it ensures that the clocks of all interconnected equipment are in exact synchronisation
- The external clock may be derived from a dedicated generator, in which case it will be applied to the rear BNC connector and **Wordclock** selected as the source in the menu. Alternatively, "digital silence" can be used in the form of an AES/EBU or S/PDIF signal without audio content; in this case, **Digital Input** is selected as the source and the appropriate input connector used. Whichever inputs are being used, an external word clock input must meet the CDR-882's frequency requirements of 44.1kHz ± 100ppm
- Use an external master studio clock as the word clock source when using the CDR-882's digital inputs. Again, this will be connected at the Word Clock input and **Wordclock** selected as the source. In this case, the word clock connected to the CDR-882 must also be connected as an external clock to the source of digital audio

- Use the CDR-882's internal clock source with digital inputs. This situation will occur when the CDR-882 is the clock master in a system. A typical scenario would be where the digital output of a semi-professional PC sound card is feeding S/PDIF to the corresponding inputs of the CDR-882. In such a case, it is likely that the CDR-882's internal clock's stability will be better than that of the sound card's. The CDR-882's digital outputs can be connected to the inputs of the sound card, to be used as its clock. The CDR-882 thus acts as the master clock source

Clock Source Display



The front panel LCD always indicates the currently-selected word clock source, whether the selection has been made automatically or manually.

- **Internal** - the internal master clock
- **DIG** - an AES/EBU or S/PDIF digital audio signal at the appropriate rear connector
- **WCLK** - a word clock signal applied at the rear BNC connector

If external word clock is selected, and the applied clock signal has a frequency outside the range 44.1kHz +/-100ppm, synchronisation is not possible and the **WCLK** indication will flash. Similarly, if Digital Input is selected, and the applied signal has a clock frequency outside this same range, synchronisation will not be possible and **DIG** will flash. In these cases, the problem will need to be resolved before a recording can be made, either by correcting the clock frequency of the external source or by selecting **Internal** or **Auto** instead.

Recording Features

Single CD

The CDR-882's basic recording operations are described on page 24. While recording on one drive, it is possible to play another disc in the other drive and route that drive's output to the CDR-882's main and/or headphone outputs. See page 18.

Dual Disc Modes and functions

By virtue of its Dual Drive record capability, the CDR-882 supports a number of useful operating modes not found on single CD recorders, or indeed other dual-drive machines.

DualBurn Record

DUALBURN mode allows two discs – one in each drive – to be recorded simultaneously with the same programme material.

It is selected with the front panel **MODE** button [25]. Note that the button scrolls between three modes, SINGLE, DUALBURN and DISCSPAN.

Recording two CDs simultaneously in DUALBURN mode is essentially no different from recording a single CD; once blank discs are loaded and DUALBURN mode selected, the RECORD and PLAY/PAUSE buttons can be used in the normal way, both drives responding to the commands.

Note that the **DRIVE SELECT** button still operates in DUALBURN mode. This is not of relevance in RECORD mode, but the user still needs to decide which drive will respond to transport commands in other modes – i.e., PLAY. The audio sent to the main and headphones outputs is determined by **DRIVE SELECT** and **PHONES SELECT**, in conjunction with the **Output Mix** and **Phones Mix** menu options, as normal.

DUALBURN mode will operate regardless of the maximum duration of the discs, though ideally, two discs of the same length should be used. Unfinalised CD-Rs or CD-RWs are also permissible, even if they contain a different audio programme. If discs of different duration are used, it may be that one disc will become full while the other is still recording. In this case, the shorter-length disc will auto-finalise (if **Auto-Finalize** is set **On**), its drive will enter STOP mode. The disc can then be ejected. If **Auto-Finalize** is set **Off**, the usual **Finalize?** message will be displayed first.

Sync Start/Stop and automatic track incrementing will operate as normal in DUALBURN mode if these functions are enabled.

DUALBURN mode may be combined with MULTI-MACHINE OPERATION mode to enable two copies of programme material greater than the duration of a single disc. In this case, the first part of the programme is recorded on the two drives of the Master machine, the remainder on the two drives of the Slave machine. This principle may be extended to more than machines if necessary. See page 42 for more information on Multi-Machine modes.

DiscSpan Mode

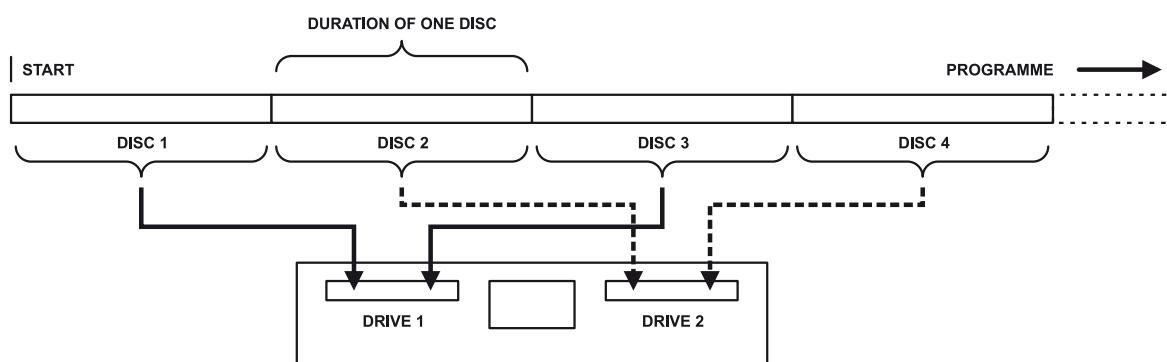
DISCSPAN mode allows the recording of programme material of longer duration than would fit onto a single CD. Examples might be live concerts, rehearsals, seminars, speeches, conferences, etc.

It is selected with the front panel **MODE** button [25]. Note that the button scrolls between three modes, SINGLE, DUALBURN and DISCSPAN.

In DISCSPAN mode, blank discs are loaded into both drives; Record Start ID and Track ID options may be selected in the normal way, the CDR-882 placed into RECORD PAUSE mode, and then recording started either manually, or automatically with the SYNC REC function.

As the first disc approaches its maximum capacity, recording is transferred to the other drive, the first disc being automatically finalised and ejected, ready for removal. If the programme being recorded is longer than can be accommodated on two CDs, a third blank disc may be inserted in the first drive, and the drive closed. As the disc in the second drive approaches its maximum capacity, recording is handed back to the first drive, and the disc in the second drive finalised and ejected. This process may be repeated as many times as necessary, up to a maximum of 99 discs.

If a non-blank disc is inadvertently inserted into a drive in DISCSPAN mode, it will not be accepted and will auto-eject as soon as it has been identified; recording will continue uninterrupted in the other drive.



CDR-882 DiscSpan Mode

As one disc approaches its maximum capacity, the other drive begins recording, so that for a period, both drives are recording the same programme. The precise sequence of events is as follows:

- The record level on the second drive is ramped up from zero (to the preset level), over the period set as the **Fade-In Time** in the **DiscSpan** submenu
- Both drives continue in record at full level for the period set as the **Overlap Time** in the **DiscSpan** submenu
- Finally, as the first drive reaches its maximum capacity, its record level ramps down to zero over the period defined as the **Fade-Out Time** in the **DiscSpan** submenu. Recording now continues as normal on the second drive

This is illustrated below.

Track IDs are recorded on the two discs as shown, to allow the CDR-882 to synchronise the two discs on playback. Although the fade-in and fade-out times can be set as low as 1 second, the track length for the fade will never be less than 4 seconds to adhere to the Red Book standard. The minimum time for overlap is 4 seconds.

It is also possible to initiate the change-over from one drive to another manually if wished, to take advantage of natural pauses or breaks in the programme being recorded. To force a drive change-over in this way, press the **DRIVE SELECT** button. A confirmation message appears on the display:

Switch drive?

Enter - Yes

Press the **ENTER** button (the AMS knob) to perform the change-over, or press **DRIVE SELECT** a second time to cancel. The "next" drive will now begin recording almost immediately, the fade-in time being reduced automatically to 100ms. In this special case, the next Track ID is still recorded 4 seconds after the start of the fade-in, to maintain Red Book compliance. The overlap and fade-out of the first drive then continue as with automatic change-over.

Track IDs in DiscSpan Mode

The maximum number of tracks which can be recorded on a single CD is 99. This is a limitation laid down in the Red Book specification. However, DiscSpan operation requires 3 Track IDs to be recorded at the start and end of each disc in the sequence, except for the first, which only requires 3 at the end.

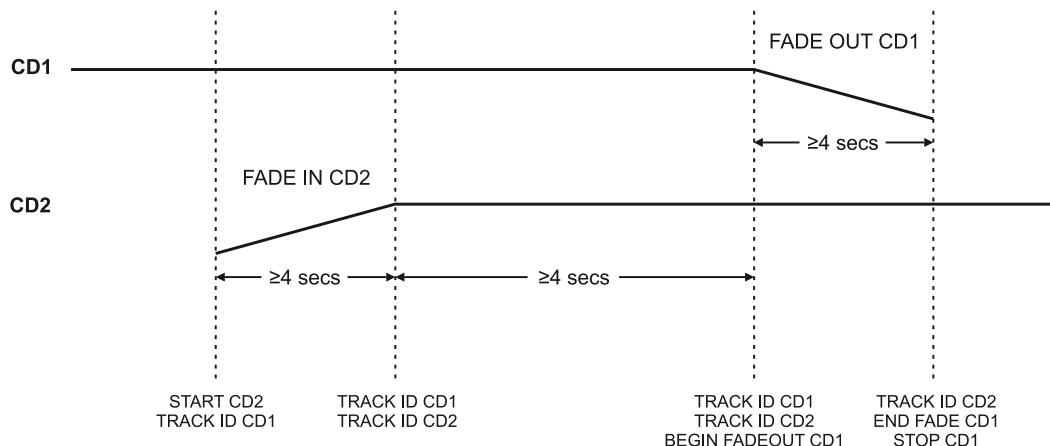
As a consequence, the maximum number of tracks that can be recorded on a CD in DiscSpan mode is 96 in the case of the first disc in the sequence and 93 on the second and subsequent discs.

Identing discs in DiscSpan Mode

Each of the series of discs recorded sequentially in DISCSPAN mode has a numeric identifier to indicate its number in the sequence. This is appended to the CD Text Title field. The default Title is "Multi", so the Title fields of a series of discs recorded in DISCSPAN mode will be:

Multi-01 > Multi-02 > Multi-03 > etc.

If the user enters his/her own Title for the sequence of recordings via the CDR-882's CD Text facility, **Multi-xx** will always occupy the last eight characters of the Title field. (See page 45 for more information about CD Text.)



CDR-882 DiscSpan Mode

Playback in DiscSpan Mode

Discs which have been recorded on a CDR-882 in DiscSpan mode may be replayed on a CDR-882 without any gap in programme. The first disc in the sequence may be loaded into either drive, with the second in the other. Note that audio routing is set automatically to be correct for seamless playback; it is not necessary to make any particular setting of **Output Mix** and/or **Phones Mix**.

DISCSPAN mode is automatically set when two DiscSpan-recorded discs are inserted. The **PLAY/PAUSE** button may be pressed to start playback from the drive containing the first disc. At the end of the first disc, the IDs that were generated during recording will be recognised by the operating system and the second disc will commence playing at the predetermined time as it has been previously been cued up accurately to do so. Its output level will ramp up due to the fade-in that was active during recording, but it will not be heard at this point. During the subsequent overlap period, however, the monitoring cross-fades from the first drive to the second. The audio level from the first disc then fades down due to the recording fade-out, and the programme continues from the second drive.

At this point, the first disc may be ejected and removed and replaced with the third disc (if there is one). At the end of the second disc, the same process is followed, and monitoring passes back to the first drive, allowing seamless playback of the sequential programme.

Disc Copy

The CDR-882 is equipped with a simple-to-operate DISC COPY function, which enables a copy to be made of a CD at high-speed. One drive is used for the "source" disc, and a blank CD-R or CD-RW is inserted in the other. Either drive may be used for the "source" disc, recording of the copy taking place in the other.

The DISC COPY function can only be used if appropriate discs of the correct type are loaded. One drive must contain a CD, CD-R or CD-RW with programme material; in the case of a CD-R or CD-RW, the disc may be unfinalised. The other drive must contain a completely blank CD-R or CD-RW (partly-recorded, unfinalised discs will not work). If the CDR-882 detects that neither drive contains a blank disc, the following message will be displayed:

Copy error

No blank CD

or if a non-blank CD-RW is detected, the following message:

Copy Error

Erase CDRW

When the discs to be used have been loaded, DISC COPY is activated by pressing the **DISC COPY** button (see page 14). The display will confirm the "direction" of copy and the total programme time on the source disc, thus:

Copy CD1-CD2

Remain 47:52

or

Copy CD2-CD1

Remain 47:52

depending on which drive contains the source disc. The Disc Copy function is also confirmed by a Disc Copy flag at the top of the display. DISC COPY can only be selected when both drives are in STOP.

Copying may be started by pressing the **ENTER** button (the AMS knob), or aborted by pressing **STOP**. While copying is under way, the Remain time display counts down to indicate progress. During copying, **STOP** may be pressed at any time to abort the process; a confirmation message will be displayed:

Abort Copy?

Enter-Y Stop-N

Pressing **ENTER** will abort the copy, **STOP** will cancel and copying will continue.

When the disc has been copied, the display confirms this:

Copy

Complete

The copy is always a completed, finalised disc, regardless of the Auto-Finalize setting in the menu. This applies even if the source disc was itself unfinalised.

NOTE: DISC COPY is a high-speed copying function which transfers programme material directly from one drive to the other by using the internal IDE data bus. Thus it is limited to copying between the drives in a single CDR-882. DISC COPY cannot be used in any Multi-Machine modes, i.e. to make high-speed copies between different CDR-882s.

Multi-Machine Operation

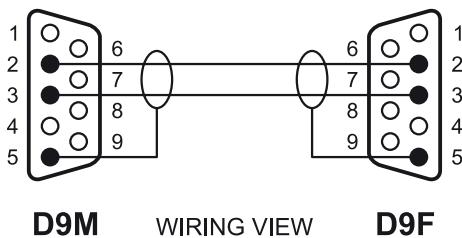
The CDR-882's recording capacity may be expanded by the connection of up to three further CDR-882 units. The operating system supports a number of Multi Machine modes to facilitate such an expansion.

In such a system, one CDR-882 is designated the Master machine and the others are assigned Slave status. Units are connected together via their RS232 serial remote control connectors to permit the transmission of control commands, tallies and other data between Master and Slave recorders.

A CDR-882 will assume Master status by default. Altering a unit's status to Slave is done through the menu system, at **DiscSpan > Master/Slave**. The default setting is **MASTER**, changing it to **SLAVE** assigns the unit as a **SLAVE**. Additionally, all machines interconnected to form a multi-Machine system must have Multi-Machine mode enabled; this is done at **DiscSpan > Multi-Machine**, which should be changed from the default setting **MASTER** to **SLAVE**. (See page 39 for full details.)

The control interconnection between Master and (the first) Slave should be made via a "straight" cable between the LINK OUTPUT RS232 connector of the Master machine and the LINK INPUT RS232 connector of the first Slave machine. A second Slave machine should have its LINK INPUT connected in a "daisy-chain" manner to the LINK OUTPUT of the first Slave, and so on for as many machines are being used.

The serial cable for control interconnection will need to be male-to-female, with pins 2, 3 and 5 on each connector connected directly together thus:



Note that interconnecting multiple CDR-882's in this way only transfers control data between machines, not audio. In Multi-Machine modes, the recommended method of distributing audio to each machine is to interconnect them via S/PDIF. By doing so, not only is audio transferred in the digital domain, but the embedded word clock within the S/PDIF bitstream ensures that all machines will be sample-locked. Additionally, Track ID and CD Text information is also transferred.

The audio source to the Master machine may be of any type, analogue or digital. Connect the first machine's S/PDIF output (coaxial or optical) to the second machine's corresponding S/PDIF input, and continue to "daisy-chain" the machines via S/PDIF in this way to interconnect all the machines being used. The default I/P SELECT setting for the second and subsequent machines is **S/PDIF coaxial**, and the Clock Source will default to **Digital Input**.

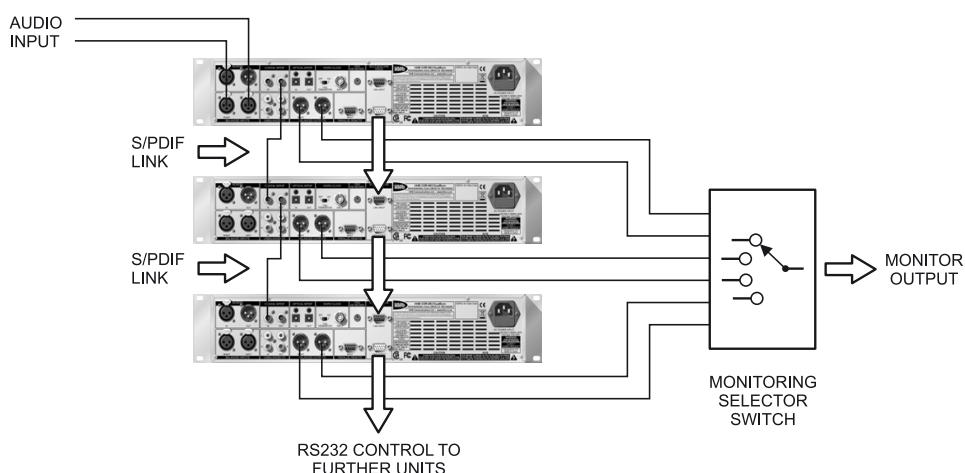
Monitoring of individual CDR-882's in a permanent or semi-permanent multi-machine system may necessitate wiring the analogue or digital outputs (as appropriate) of each CDR-882 to an external switching arrangement of some description. This will enable the operator to use any machine in the chain for playback (as recording permits), or to monitor the record signal at any point in the chain with the **MONITOR** buttons.

Multi-Machine + DualBurn Operation

DUALBURN mode may be selected whilst Multi-Machine operation is enabled. This permits up to eight discs to be recorded simultaneously.

As with Single-Machine DualBurn mode, all blank discs should ideally be of equal length. The Master machine's transport buttons will control all Slave machines as well as itself. Having loaded all drives with blank discs, press the **RECORD** button on the Master machine; this will put all the machines in the system into RECORD PAUSE mode.

Depending on the options selected for Start ID, recording will commence on all drives simultaneously either when an ID is received or when the **PLAY/PAUSE** button is pressed if recording is being started manually. Manual or automatic insertion of Track IDs will be passed from Master to Slaves in the same manner, and actioned on all discs being recorded.



Multi-Machine + DiscSpan Operation

DISCSPAN mode may be used in conjunction with Multi-Machine mode to make a recording of a very long programme across up to eight blank discs, each in a different drive, across four CDR-882s. This may be useful where unattended recording has to be performed. Blank discs may be loaded into both drives of all machines in the system, recording initiated (perhaps with the Time Interval option for Track ID selected) and the system then left.

This mode is set by selecting DiscSpan on the Master machine, which automatically selects DiscSpan on the Slaves. It is recommended that audio is cascaded between machines via an S/PDIF link, to ensure frame-accurate synchronisation between discs in different machines. The S/PDIF link also passes CD Text and Track ID data for identifying the discs in a sequence and locks the audio clocks in different machines together.

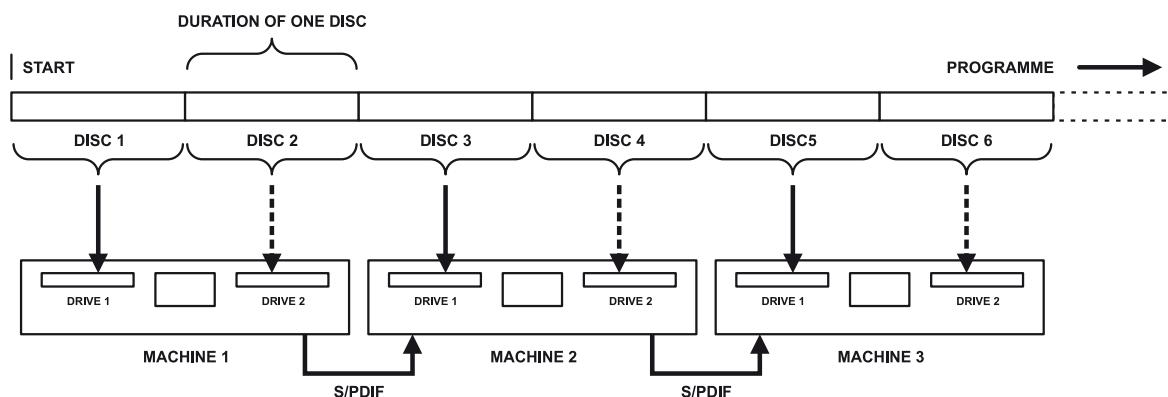
Recording in the Master machine will proceed as per the Single-Machine DiscSpan operation described at page 39, with the first-selected drive "handing over" to the other when its disc becomes full. As the disc in the other drive approaches maximum capacity, recording will now pass to the first-selected drive in the second machine, with fade-in, overlap and fade-out all being observed correctly as if the third disc was in the first machine. At the end of the third disc, recording passes to the other drive of the second machine.

This process will continue until the system runs out of machines and/or blank discs, or is stopped by the operator. At the end of the second disc in the last machine, the system will look at the first drive in the first machine. If this has been reloaded with a blank disc, the recording will continue in that drive. If not, the recording will end.

Replay of discs recorded in Multi-DiscSpan Mode

Playback of a sequence of discs recorded on multiple machines in DiscSpan mode makes use of the S/PDIF digital audio link between machines. The discs should be loaded into the drives in the same order in which they were recorded. Audio from the Master machine is passed to the next machine in the chain via the S/PDIF interconnection, where it is "mixed" with the contribution from that machine at the appropriate time. This mix is passed in turn to the next machine, and so on, until the full sequence of seamless audio may be obtained from the last machine in the chain. Fade-out, Overlap and Fade-In are all observed correctly as in Single Machine DiscSpan playback.

There is no restriction to replaying a sequence of 2+ discs recorded in Multi-Machine DiscSpan mode on just one machine. The only requirement is that the discs are loaded into the two drives of the one machine in the correct order, as would be the case with Single Machine DiscSpan playback.



CDR-882 Multi-Machine & DiscSpan Operation

Program Play

The CDR-882's AMS control may be used to quickly locate playback to a particular track on a disc, or to commence playback of a series of consecutive tracks from the first of them. However, it is sometimes necessary to play a series of tracks on a disc in a specific order. Program Play allows the user to create a playlist of tracks in any order.

Program Play mode is allied with Program Copy mode, which is described in detail in the next section of the manual.

The principle of Program Play extends across both drives on the CDR-882; i.e. tracks from two different discs may be assembled into a Program Play sequence.

Program Mode can only be entered from STOP mode. When selected with the **PROGRAM** button, the display initially shows the Track Entry screen:

CD1 Track 01

00 00:00

Tracks may be added to the playlist by using the AMS control to increment the track number to that of a required track, and selecting it with the **ENTER** button. The time display below, initially zero, will show the number of tracks selected (the first two digits) and their total combined playing time. If two discs are being used to compile a track list, the tracks on the second disc will be displayed by scrolling "past" the last track on the first disc; these may be added in the same way.

At any time, **PLAY/PAUSE** may be pressed to audition the selection; the display changes to the "normal" screen, except that Program Play mode is confirmed by text at the screen top right. In Program Play, the AMS control may be used to advance and retard through the tracks in the playlist, in the correct play order. **FREW** and **FFWD** will still operate in the normal way, but will not transfer the current play location beyond the current track. Pressing **PROGRAM** again returns the display to the Track Entry screen. To clear the playlist, press **STOP** while the Track Enter screen is being displayed. Pressing **PROGRAM** from the Track Enter screen while in STOP will cancel Program Play mode and return the CDR-882's operating mode to that last selected with the **MODE** button. However, the playlist contents remains stored until cleared or the disc(s) are removed. Pressing **STOP** while in Stop Mode will clear the playlist contents.

Program Copy

Program Copy mode may be considered to be a combination of Program Play and Disc Copy modes (but see note below regarding finalisation). A playlist is created in the same manner as for Program Play mode; whereas Disc Copy will copy the entire contents of a disc to a blank disc in the other drive, in Program Copy only the tracks in the playlist are copied. However, they are copied in the order in which they were programmed into the playlist.

As one drive must contain a blank disc, Program Copy mode does not allow the option of programming tracks from two different discs.

Programming of tracks is performed in almost the same way as in Program Play. If one of the drives contains a blank CD, pressing the front panel **PROGRAM** button will bring up the display as shown below :

Program Play

Program Copy

One of the options will be in reverse video (highlighted). The AMS rotary control may be used to select Program Copy, and the **ENTER** button (the AMS knob) selects it. The screen shown below will be displayed:

Track 01

00 00:00

Tracks are now added to the playlist with the AMS control as with Program Play mode. The display will show the number of tracks in the playlist and the playlist's total time. When the list is complete, pressing **PROGRAM** again displays the following screen:

Start Copy?

Enter-Y Stop-N

Pressing **ENTER** (the AMS knob) will start the copy process; pressing **STOP** will cancel.

IMPORTANT: Unlike Disc Copy mode, finalisation is not implicit in Program Copy mode. Finalisation will be performed automatically if the **Auto-Finalization** option has been set to **On** in the **RECORD** submenu, but not otherwise (see page 34). When all the tracks from a source disc have been copied to the destination disc, the source disc may be changed for a different one, so that a CD can be assembled from tracks from several source discs, in any order.

When the copy is complete, finalisation should be performed manually (see page 25).

CD Text

The CDR-882 is CD Text-compatible. Any CD Text data on CDs being played will be displayed on the front panel LCD by default. CDs being recorded on the CDR-882 can have CD Text data added using a standard QWERTY keyboard plugged into either of the PS/2 ports (on the front and rear panels, see page 15 and page 11).

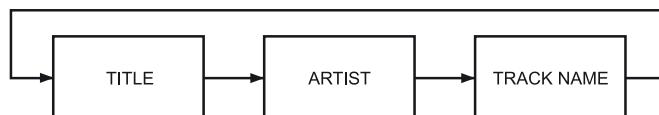
CD Text is formatted into 3 fields, named Title, Artist and Track. Title and Artist are per-disc fields and Track is per-track. The text strings may contain any characters found on a standard keyboard.

Displaying CD Text

When a CD containing CD Text data is played, the time display for the drive containing the disc changes, the mm:ss digits, the CD type (CD, CD-R, etc.) and the time display option (TOTAL, TOTREM, etc.) are replaced by the contents of the CD Text Title field. The track number and transport mode symbol are still displayed. When first displayed, the text will scroll automatically from right to left to reveal all the characters of a long title.



Successive presses of the TEXT button (see page 13) will alter the CD Text display to show the Artist and Track fields (if a track is currently selected) in a similar manner. A final press will return the display to the Title field; this sequence is illustrated below:



The legends **TITLE**, **ARTIST** or **TRACK** is displayed in the top right-hand corner of the display screen to confirm which field is being displayed.

Pressing the **DISPLAY** button will revert the display to show the "normal" time information; pressing **TEXT** again returns to CD Text mode.

Entering CD Text

CD Text can only be added to unfinalised discs. Text entry may be made either while the drive is in RECORD mode, or after recording has finished - but before the disc has been finalised. For this reason, Auto-finalization should be set to 'Off' when CD Text is to be entered.

To enter CD Text data, connect a QWERTY keyboard to whichever of the CDR-882's two PS/2 sockets is more convenient. Press the **TEXT** button once, twice or three times to select the field for which data is to be entered, Title, Artist or Track. The display will initially show **No CD Title**, **No Artist** or **No Track Name** as appropriate. Entering text via the keyboard will overwrite this, and the text will be visible on the display as it is keyed in. Note that the initial keystroke is ignored. The BACKSPACE key will delete from the last character entered in the normal way. Conclude each text entry with the RETURN key to store the text in memory.

In the case of Track Name, the entered text will be applied to the track currently selected with the AMS knob. If track names are to be entered while each track is being recorded, this will obviously be the correct track, but if track names are being entered after recording (pre-finalisation), care must be taken to advance the track selection with the AMS knob to the correct track, in turn.

Cueing

Manual Cueing

The CDR-882 has a simple single-memory locator function, which allows the user to accurately cue a disc at a previously-stored location.

Note that all the Cue functions are only operative in PLAY or PAUSE modes.

Storage of a cue point is made with the "press" function of the AMS knob, which in PLAY and PAUSE modes acts as a **MARK** button. To store the present disc location, press **MARK**, either while the disc is playing, or the drive is paused at the required location. Confirmation that a cue point has been written is given by the word **MARK** in the bottom right-hand corner of the display. Any subsequent press of the **MARK** button will overwrite with new data; the MARK memory always contains the location at the last press of **MARK**.

The disc may be relocated to a stored cue point at any time by pressing the **ID WRITE | CUE** button, which in PLAY and PAUSE modes acts as a **CUE** button. Playback will recommence from the cue point, unless AUTO-CUE or AUTO-PAUSE modes have been selected (see below), or the disc was already in PAUSE. In these cases, playback will locate to the cue point but be held in PAUSE mode. If no cue point has been stored, the CUE command will be ignored.

The MARK memory is CD-frame-accurate (i.e. to approx. 13ms), and includes track and drive number, so it is possible to locate to a cue point on the other drive from that currently selected. The last-stored cue point will remain in the MARK memory until the disc is ejected.

Editing Marker Points

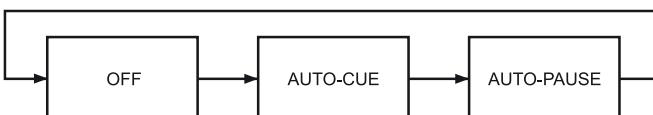
The position of the cue point stored with the MARK function may be modified to improve its accuracy, or simply to alter its value without having to play the disc through that point to capture the time. The position of the cue point may be altered with frame accuracy.

Editing of the MARK point is done in the menu system, at **Edit Marker > Direct Mark**. Drive number and track number are modifiable as well as the time (in mm:ss:ff). See page 32 for a full description of the Edit Marker process.

Auto-Cue

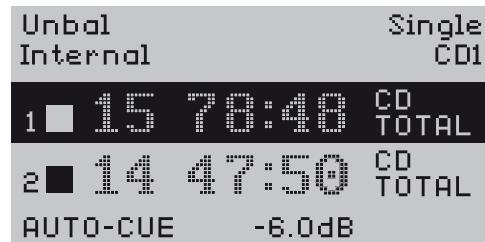
This function is particularly useful when the CDR-882 is being used to play out spot SFXs, or similar applications. It locates a disc to the point at the start of a track where the audio actually begins, thereby eliminating the short (but variable) period of silence which often precedes the audio.

Auto-Cue mode is enabled by pressing the **ID AUTO/MAN/AUTO-CUE** button, which in PLAY and PAUSE modes acts as an AUTO-CUE mode selector. The button cycles through AUTO-CUE and AUTO-PAUSE modes before returning to OFF:



Selection of AUTO-CUE mode is confirmed by the text **AUTO-CUE** in the bottom left-hand corner of the display.

With AUTO-CUE selected, the drive will automatically enter PAUSE at the start of the audio at the beginning of a track, whether it has been located to it with the AMS control, or because the previous track was played. The drive will then enter PAUSE mode at the point where the audio level rises above the level which has been set in the menu system at **Edit Marker > Auto-Cue Threshold** (see page 32). This condition is indicated on the front panel by both the green LED in the **PLAY/PAUSE** button and the **AUTO-CUE** on-screen text flashing. Playback, with "instant" audio, will begin when the **PLAY/PAUSE** button is pressed again.



The audio threshold level determining the point at which the drive enters PAUSE mode is adjustable in the menu from -78dBFS to -24dBFS

If the **CUE** button is used to locate to a previously-stored MARK point, the disc will enter PAUSE mode at the cue point if AUTO-CUE is enabled, instead of immediately resuming playback.

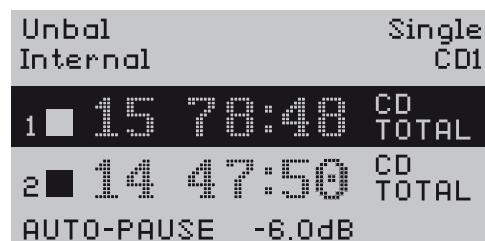
At the end of the track, the disc will enter PAUSE mode at the audio threshold point of the next track.

Auto-Pause

This mode is useful for ensuring that no audio from the track following the one required on a disc is played out inadvertently.

AUTO-PAUSE mode is selected by pressing the **ID AUTO/MAN/AUTO-CUE** button until **AUTO-PAUSE** is displayed in the bottom left-hand corner of the screen.

With AUTO-PAUSE selected, the drive will automatically enter PAUSE mode at the start of a track, whether it has been located to it with the AMS knob or because the previous track was played. When in PAUSE at the track start, both the green LED in the **PLAY/PAUSE** button and the AUTO-PAUSE on-screen text will flash.



Pre-selecting a track before loading a disc

This feature allows the user to select a particular track on a disc for playback before it is loaded in the machine, thereby minimising the number of button presses required.

To make use of this feature, press **EJECT** to open the tray of the drive to be used, and insert the disc. Ensure that **DRIVE SELECT** is set to the drive being used. The **AMS** control can now be used to pre-select a track; as the control is rotated, track numbers are displayed in the normal way. With the number of the required track showing, either **PLAY/PAUSE** or **ENTER** may now be pressed. The tray closes, the disc is read, and playback commences from the start of the selected track.

TRACK PRE-SELECT is even simpler when commanded from the RC-882 remote control. Pressing the numeric keys (**0** to **9**, **10/0** and **>10**) will immediately initiate the playback sequence, starting with the selected track.

Because the CDR-882 cannot know how many tracks are on the disc before it has been loaded and read, it is possible to pre-select a track with a number greater than that of the number of tracks on the disc. Should this occur, playback commences from the last track on the disc.

Disc End Review

The CDR-882 permits tracks to be added to a CD-R or CD-RW at will – a disc does not have to be fully recorded in a single pass. The **DISC END REVIEW** function allows the user to review a partly-recorded disc “to date” by checking the last recorded track.

When a partly-recorded CD-R or CD-RW is placed in a drive for further recording, **RECORD PAUSE** mode is entered in the normal way by pressing the **RECORD** button. If the **FREW** button is now pressed and held, the drive scans backwards through the last recorded track(s), with audio. The **FREW** button may be released at any point, which causes the drive to enter **PLAY** mode at that point, play the disc until the end of the last track, and then enter **RECORD PAUSE** again. Recording can now be commenced in the normal way.

Note that the **FFWD** and **FREW** buttons are available to perform their normal functions of scanning the recorded material (with audio) in either direction from **PLAY** mode.

If the **RECORD** button is pressed while the disc is playing in **DISC END REVIEW** mode, the drive jumps forward to the end of the last track, and enters **RECORD PAUSE**. Recording can now be commenced in the normal way.

Erasing and Unfinalising discs

It may be necessary (or desired) to erase some or all the tracks already recorded on a CD-RW prior to recording new tracks on it. The CDR-882 includes a simple-to-use **ERASE** function which can be used to either erase tracks from a CD-RW, or to completely re-initialise it.

The first process in erasing a disc is unfinalisation, where just the disc's TOC is erased. It is then possible to add more tracks to those already on the disc, or to erase the existing tracks.

Initialising a CD-RW completely removes all previously recorded material and returns the disc to a “virgin” state where all its space may be re-used. Initialisation is a different physical process which takes much longer than erasure.

Because of the physical way that tracks are written on a CD-RW, there is a constraint on which tracks can be erased. Tracks can only be erased from the last track “backwards”. It is not possible to erase a track “in the middle” of a CD-RW, leaving higher-numbered tracks on the disc as well.

Example – if a CD-RW contains 10 tracks, the following tracks may be erased:

- track 10 alone (i.e. the last track)
- tracks 9 and 10 (i.e. the last two tracks)
- tracks 8 to 10 (i.e. the last three tracks)

and so on, up to:

- tracks 2 to 10 (all the tracks on the disc)
- Erase Disc is the same as Erase tracks 1 to 10



Erasing/Initialising a single CD-RW

Insert the CD-RW into a drive, and if necessary, select the drive with the **DRIVE SELECT** button. When the drive has completed the reading process and the track information is displayed, press the **ERASE** button. The display will change to

Erase nn-nn (where **nn** is the total number of tracks on the disc).

This first erase option is to erase only the last track on the disc. The remaining erase options may be viewed by rotating the **AMS** control clockwise, one click at a time. Each click decrements the first of the two numbers by one. Thus if there are 5 tracks on the disc, the initial display will be:

Erase 05-05

and then, in turn:

Erase 04-05, Erase 03-05, Erase 02-05, Erase Disc, Init Disc

(after which **Erase 05-05** is displayed again.)

Erase Disc means that all the tracks on the disc will be erased; **Init Disc** means that the disc will be completely re-initialised.

When the required selection of tracks to be erased, or the full erasure option is displayed, the erase process is initiated by pressing **ENTER** (the AMS control). Alternatively, the erase function may be aborted by pressing **ERASE** a second time.

As erasure commences, the display will show:

Erase 0%

and the percentage indication will then show the progress. As stated above, initialisation is a much slower process than track erasure. After erasure/initialisation is complete, the drive returns to STOP, and the number of tracks remaining is confirmed by the display.

Erasing/Initialising two CD-RWs

If both drives contain CD-RWs, the user has the option to erase selected tracks from each in turn as described above, switching between drives with **DRIVE SELECT**. However, the range of erase options offered is extended to include erasing or initialising on both drives simultaneously.

Rotating the AMS control one click clockwise past **Init Disc** will offer the options

Erase Discs

followed by

Init Discs

Selecting one of these options (by pressing **ENTER**) will initiate erasure or initialisation on discs in both drives simultaneously.

SCMS

The SCMS (Serial Copy Management System) was developed to restrict the number of copies which could be made from a digital recording via the digital domain. The system has been incorporated into all consumer digital audio equipment for many years. With commercially-produced CDs, it limits the number of copies which can be made by using an S/PDIF interconnection to one.

In the simplest terms, SCMS functions by setting certain bits in the digital bitstream. These are inspected by an SCMS-equipped recorder and a recording is only permitted if the "first-generation-only" criterion is met.

The restrictions imposed by SCMS are generally too limiting for professional use. As a professional product, the CDR-882 provides full control over SCMS operation in two ways.

Firstly, the digital input bitstream is not checked for copy protection bit validity. The CDR-882 will record from any digital source. This applies to all digital inputs.

Secondly, the copy protection bits can be set as required for the discs being recorded. This setting is made via the Record submenu of the menu system, at the SCMS option. Three settings are available: **Prohibit Copies**, **Copy Once** and **Permit Copies**, corresponding to none, one or unlimited copies respectively. (See page 35 for full details.)

Discs recorded in the CDR-882 subsequently played on consumer CD players will cause the copy protection bits at the S/PDIF outputs of those players to be set according to how the SCMS menu setting on the CDR-882 was set at the time the discs were recorded. The source of the programme material at the time of recording is of no relevance; this includes discs recorded using the CDR-882's high-speed DISC COPY function.

The CDR-882 is SCMS-compliant in playback; the SCMS bits in the digital outputs are set only according to the copy protection status of the disc being played.

Remote Control

In some installations, it may be desirable to control the CDR-882 from an external control system of some kind. Two rear panel connectors are provided for this purpose, the Parallel Remote Input and the RS232 Link Input. The Parallel Remote Input provides the main transport commands only, while the RS232 Link Input allows control of virtually every machine function, parameter and setting.

Parallel Remote Control Port

The rear panel Parallel Remote Input permits control of five transport functions, and provides tallies for three functions. The five active commands may be selected from a set of eight, and the three active tallies from a set of five. These are shown in the table below.

INPUTS (COMMANDS)	Default	OUTPUTS (TALLIES)	Default
PLAY/PAUSE	Input 1	PLAY	Output 7
RECORD	Input 2	PAUSE	Output 8
STOP	Input 3	RECORD	Output 9
AMS +	Input 4	NO DISC	-
AMS -	Input 5	CHANGE OVER	-
FFWD	-		
FRWD	-		
EJECT	-		

The commands and tallies listed in bold are the factory defaults. If a different command set is preferred, an alternative combination comprising any five (or less) of the eight available commands, and any three (or less) of the five available tallies may be reassigned to the inputs and outputs respectively via the menu system. See page 36 for full details of changing the default assignment.

The Parallel Remote Input is suitable for basic control of the CDR-882 from a dedicated set of hardware switches or similar. It is also possible to connect an external control system (e.g. Crestron, AMX) to the Parallel Remote Input, using relays or opto-coupled inputs and outputs within such systems.

Pinout

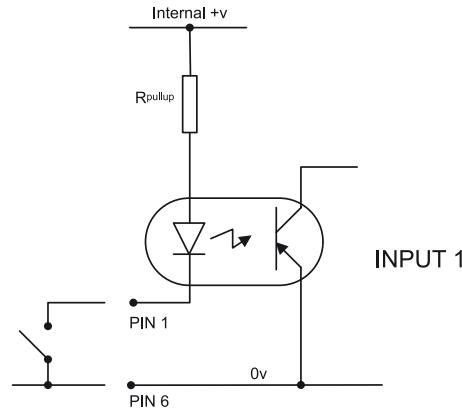
The connector is a D9F. The pinout is shown in the table:

PIN	FUNCTION
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	0v
7	Output 1
8	Output 2
9	Output 3

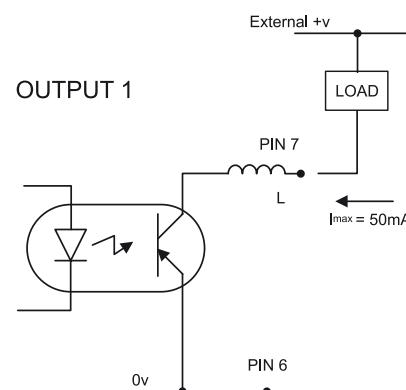
Electrical characteristics

Both inputs and outputs are internally opto-isolated, and include a series inductor for EMC purposes.

The inputs simply require a short-to-ground for activation.



The outputs are open-collector, and go low when activated. Loads such as LEDs may be connected externally with a suitable series resistor, and returned to the +ve terminal of an external PSU. The maximum current deliverable by the opto-isolator's transistor is 50mA. (The -ve side of the external voltage supply should be referenced back to the CDR-882's 0v on pin 6.)



RS232 LINK INPUT

The rear panel RS232 Link Input provides serial control of virtually every machine function, parameter and setting. This connector will also be used by the Slave machines in a Multi-Machine set-up; the Master machine in such a set-up interchanges control data with the Slaves through its RS232 Link Output connector. Thus RS232 control from an external control system is still possible with multiple machines, as it is only the Master machine which needs to communicate with the external control system. See page 42 for details regarding Multi-Machine interconnections.

This section of the manual provides details of the port parameters and an abridged serial command list, which includes the main machine functions. The full RS232 protocol is beyond the scope of this manual, but can be referenced or downloaded as a .pdf file at www.hhb.co.uk.

Pinout

The rear panel connector is a D9M. The pinout is shown in the table:

PIN	FUNCTION
1	n/u
2	Data receive
3	Data transmit
4	+5v
5	0v
6	n/u
7	RTS
8	CTS
9	n/u

Port parameters

PARAMETER	VALUE/SETTING
Data type:	RS232C serial, 3-wire, half-duplex
Data speed	9600 baud
Word length	8 bits
Parity	None
Stop bits	One

Abridged command set

The commands listed in the below will perform the same function as their equivalent front panel buttons. For all other commands, data requests and responses, please refer to the CDR-882's full RS232 protocol specification.

COMMAND	DATA STRING (HEX)
ENABLE REMOTE MODE (see note 1)	7E 07 05 61 10 01 FF
DISABLE REMOTE MODE (see note 1)	7E 07 05 61 10 02 FF
SELECT DRIVE 1	7E 08 05 61 02 DC 00 FF
SELECT DRIVE 2	7E 08 05 61 02 DC 01 FF
EJECT DRIVE 1	7E 08 05 61 02 40 00 FF
EJECT DRIVE 2	7E 08 05 61 02 40 01 FF
PLAY/PAUSE	7E 07 05 61 02 05 FF
STOP	7E 07 05 61 02 02 FF
PREVIOUS TRACK	7E 07 05 61 02 15 FF
NEXT TRACK	7E 07 05 61 02 16 FF
FFWD (see note 2)	7E 07 05 61 02 14 FF
FREW (see note 2)	7E 07 05 61 02 13 FF
RECORD ON	7E 07 05 61 02 08 FF
SYNC RECORD	7E 07 05 61 08 07 FF
MARK	7E 07 05 61 02 90 FF
CUE	7E 07 05 61 02 91 FF
KEY OFF (see note 2)	7E 07 05 61 00 00 FF

NOTE 1: The CDR-882's RS232 port must be enabled by the REMOTE ON command before any further RS232 commands will be accepted. Once REMOTE MODE has been enabled, neither the front panel controls nor the RC-882 handset will operate, and operation of the CDR-882 can only be controlled with the RS232 Link Input or the Parallel Remote Input. REMOTE MODE must be disabled before the front panel controls and handset will function again.

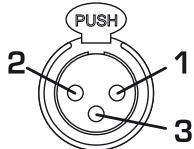
The ENABLE REMOTE MODE command causes both drives to enter STOP mode if they are not already in it.

NOTE 2: KEY OFF cancels the FFWD and FREW commands.

Appendix 1 - Connector Pinouts

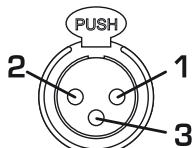
NOTE: Numbers refer to the rear panel diagram on page 10. All connector views are looking at the rear of the CDR-882.

Analogue Inputs (Balanced) (1)



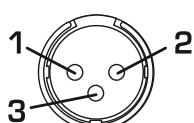
Connector: XLR3F	
PIN	FUNCTION
1	Screen
2	Signal 'hot' (phase)
3	Signal 'cold' (anti-phase)

AES/EBU Input (3)



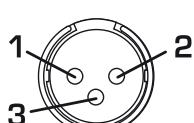
Connector: XLR3F	
PIN	FUNCTION
1	Screen
2	Data 'hot' (phase)
3	Data 'cold' (anti-phase)

Analogue Outputs (Balanced) (6)



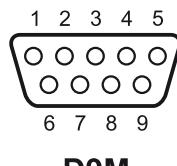
Connector: XLR3M	
PIN	FUNCTION
1	Screen
2	Signal 'hot' (phase)
3	Signal 'cold' (anti-phase)

AES/EBU Output (8)



Connector: XLR3M	
PIN	FUNCTION
1	Screen
2	Data 'hot' (phase)
3	Data 'cold' (anti-phase)

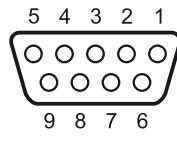
Multi-Machine RS232 Link Input (male) (11)



D9M

Connector: D9M	
PIN	FUNCTION
1	n/u
2	Data receive
3	Data transmit
4	+5v
5	Ov
6	n/u
7	RTS
8	CTS
9	n/u

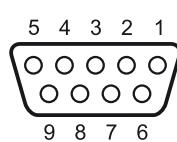
Multi-Machine RS232 Link Output (female) (4)



D9F

Connector: D9F	
PIN	FUNCTION
1	n/u
2	Data transmit
3	Data receive
4	+5v
5	Ov
6	n/u
7	CTS
8	RTS
9	n/u

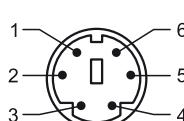
Parallel Remote Input (female) (13)



D9F

Connector: D9F	
PIN	FUNCTION
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Ov
7	Output 1
8	Output 2
9	Output 3

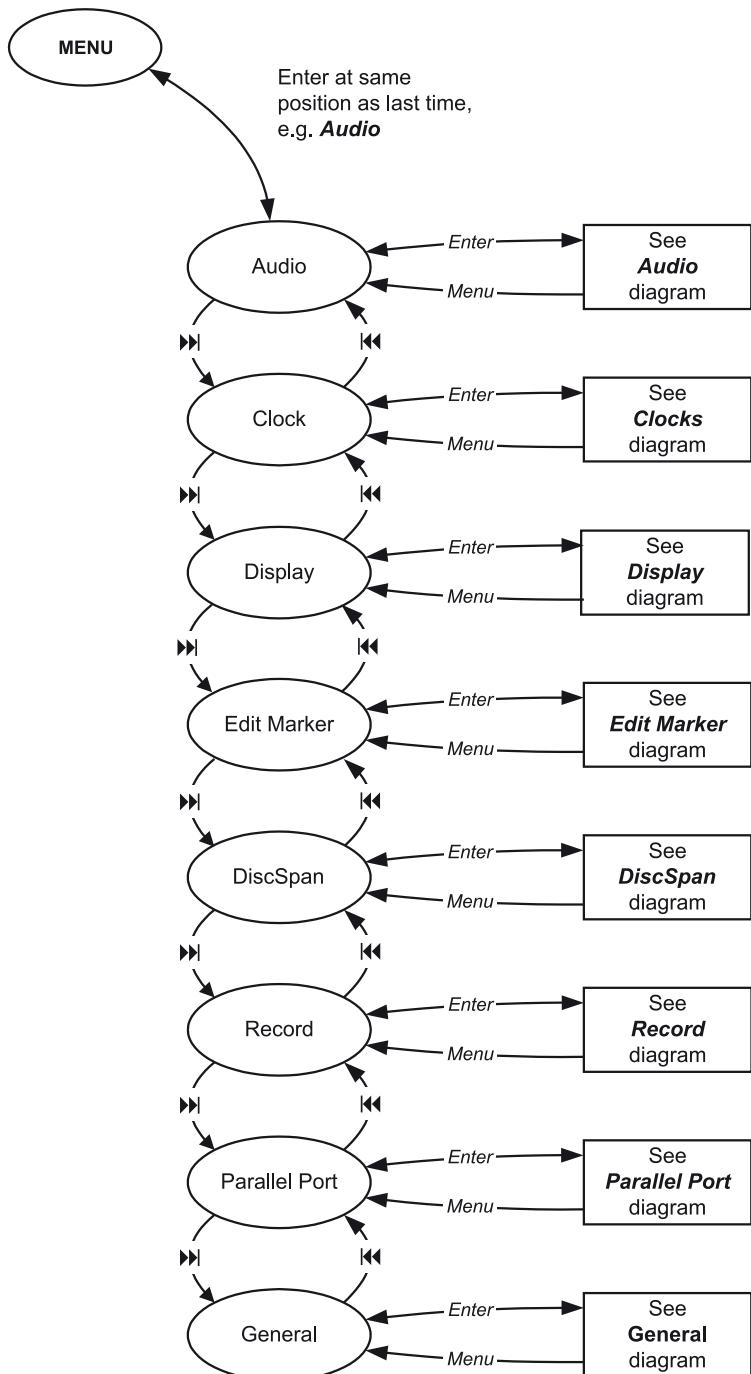
PS/2 Keyboard (15)



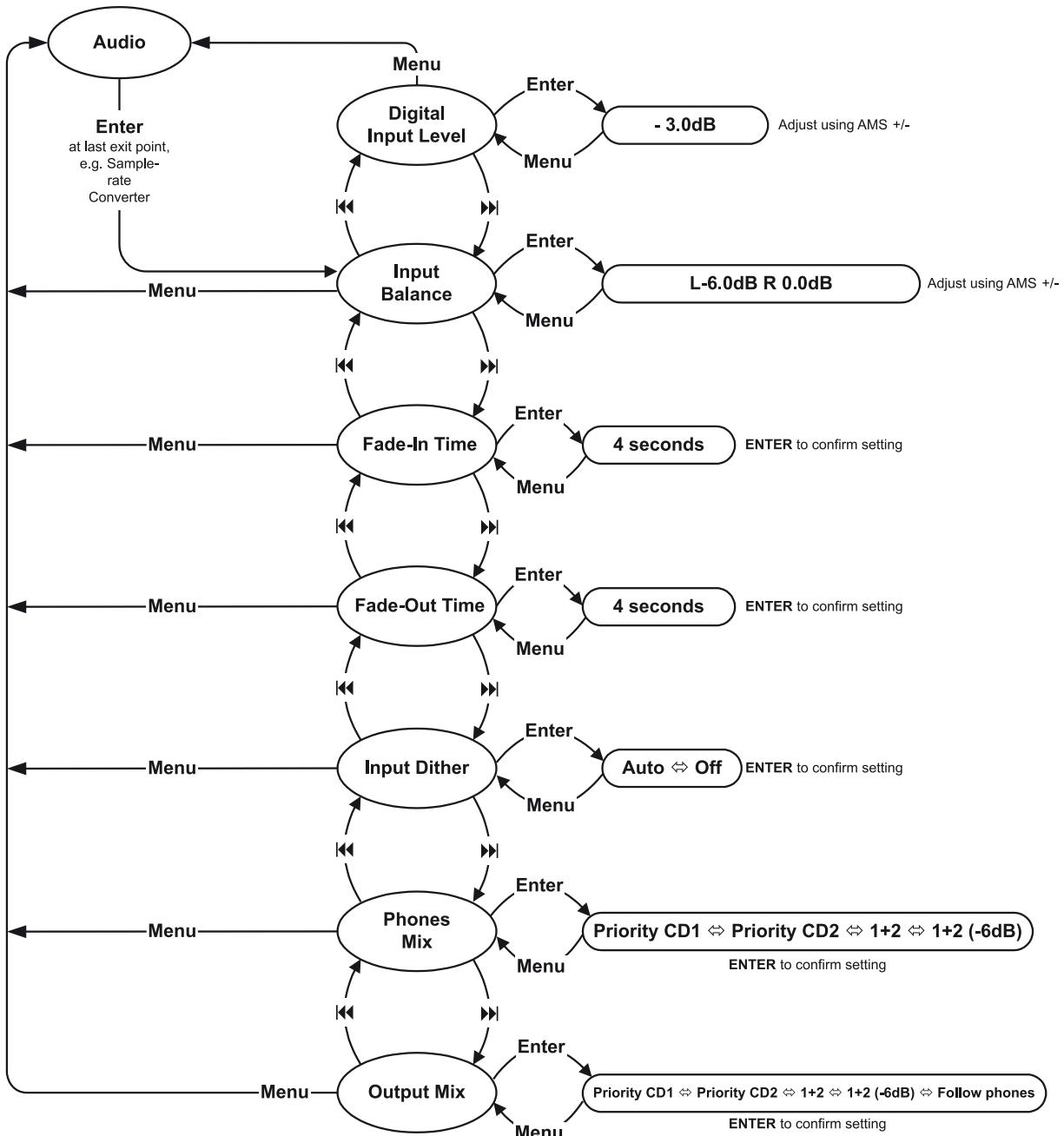
Connector: PS/2 socket	
PIN	FUNCTION
1	Clock
2	Gnd
3	Data
4	n/c
5	Vcc
6	n/c

Appendix 2 - Menu Flow Diagrams

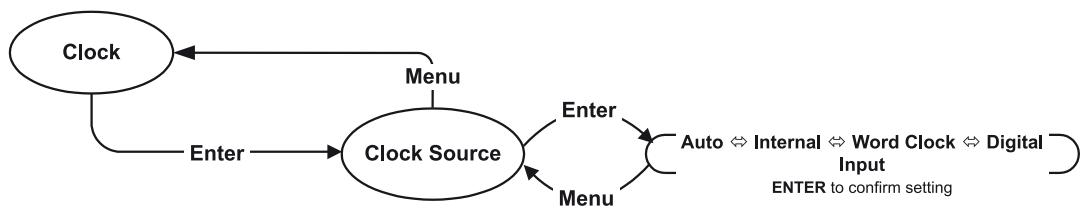
Submenus



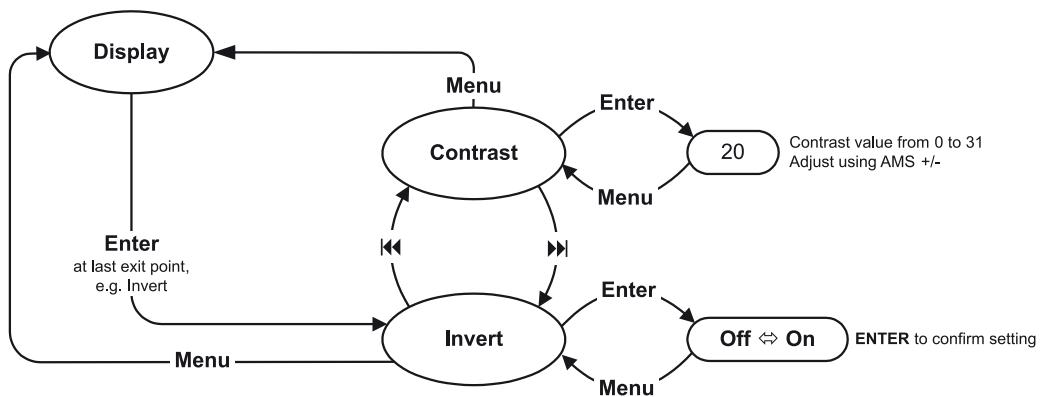
Audio



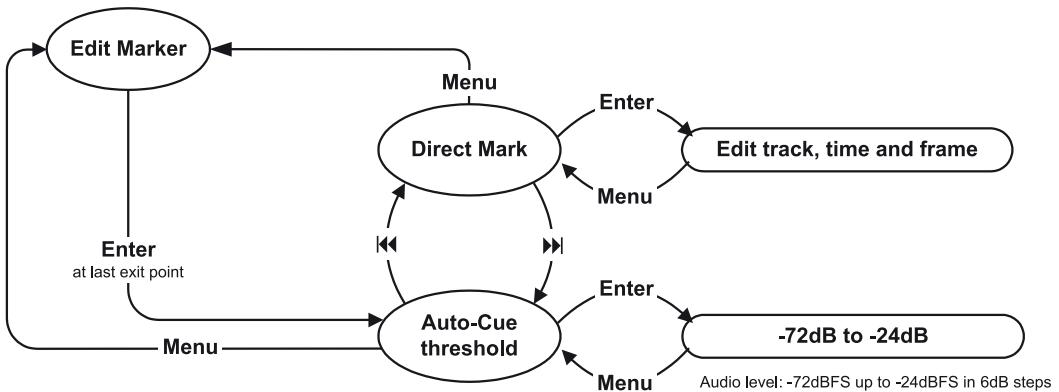
Clock



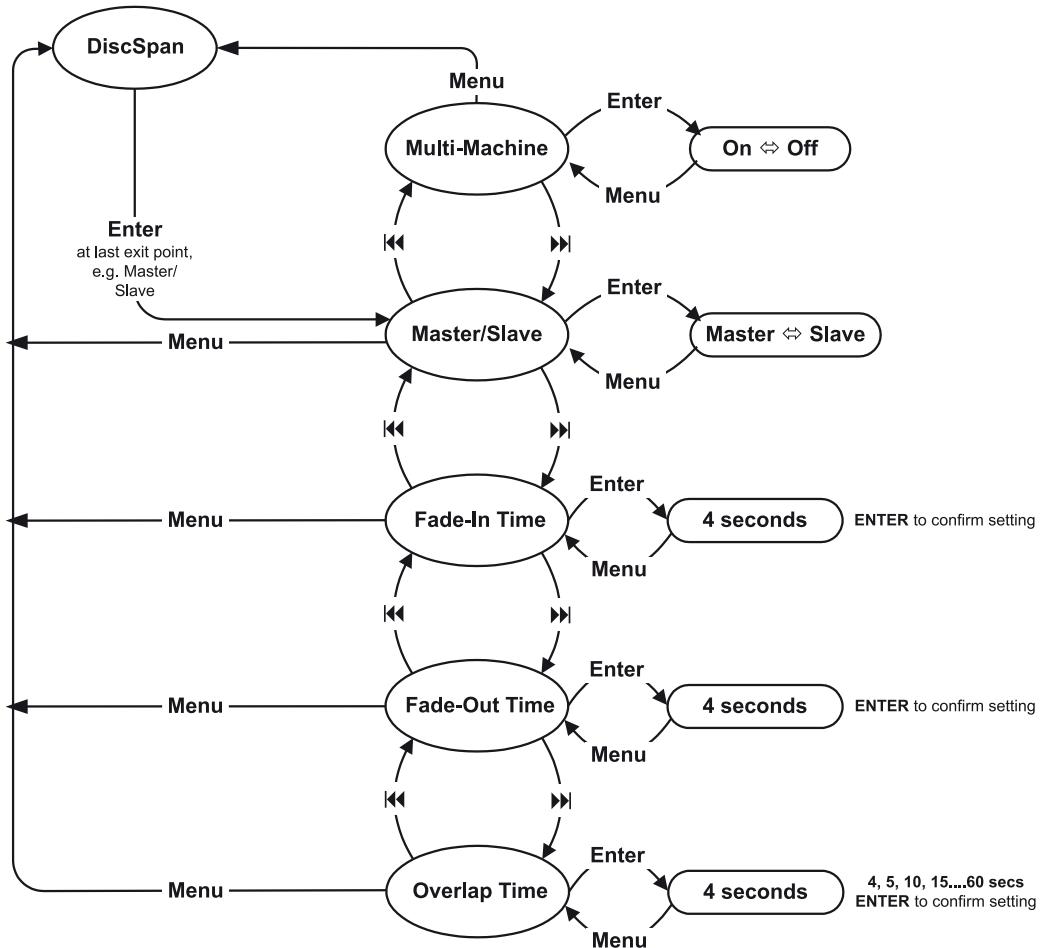
Display

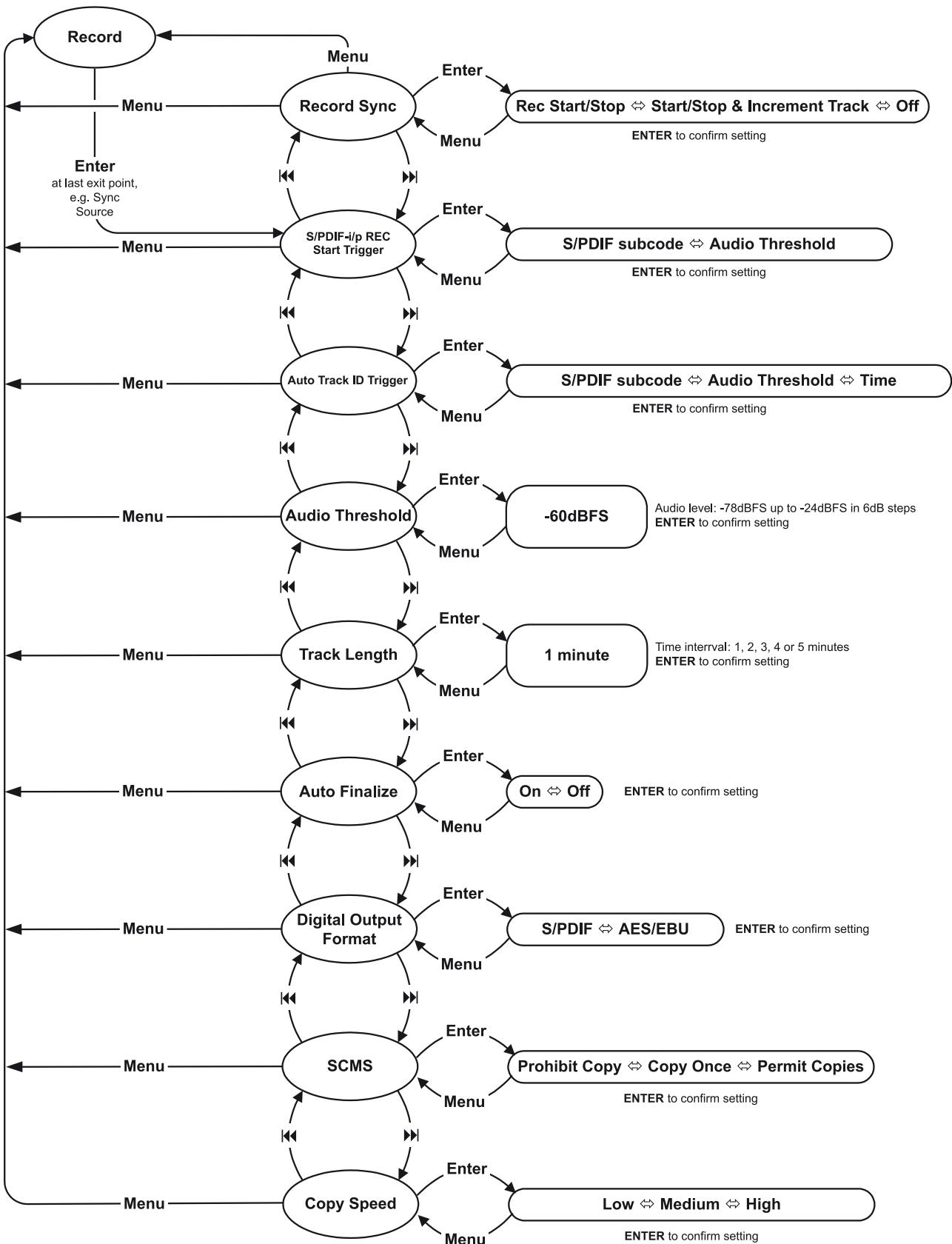


Edit Marker

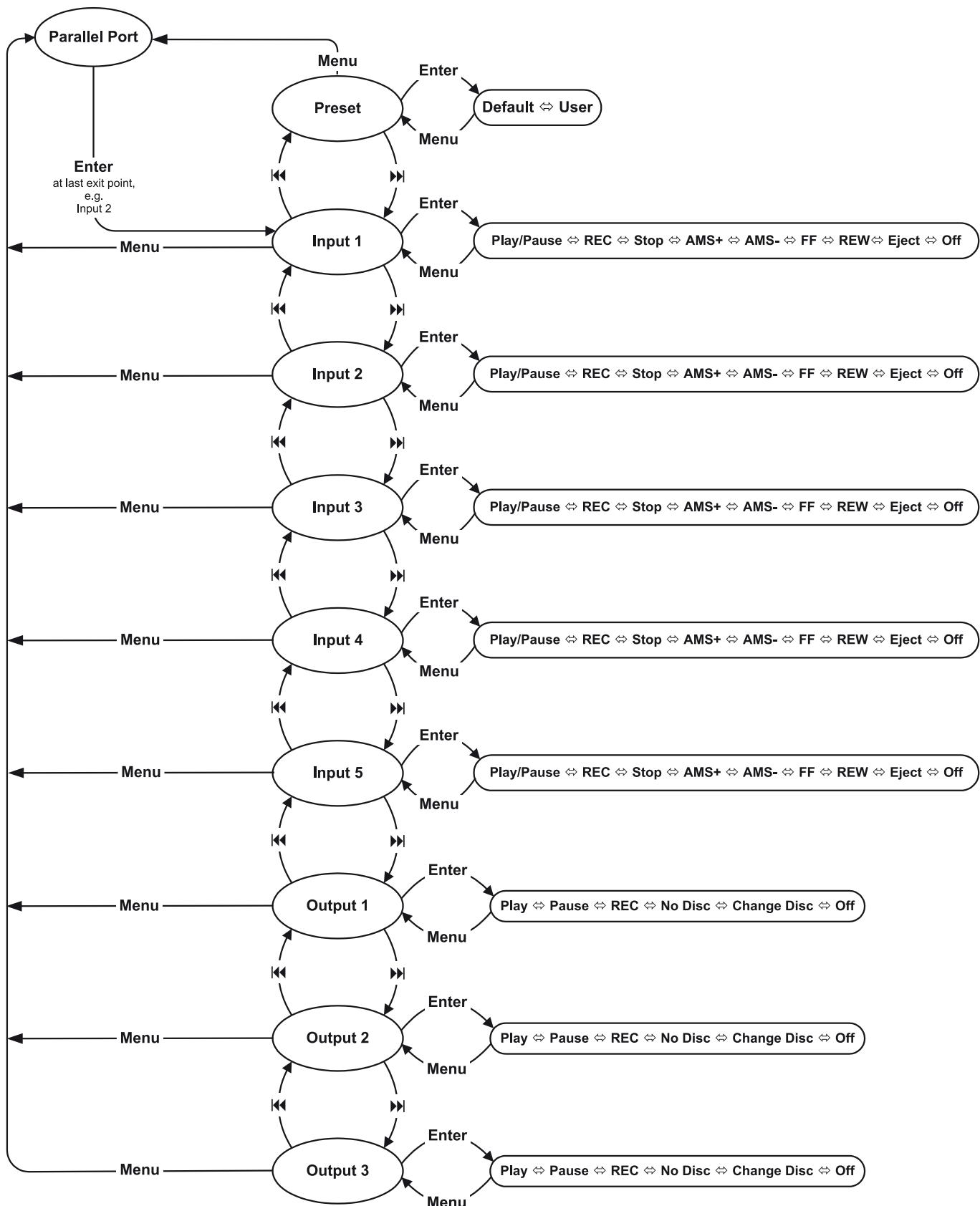


DiscSpan

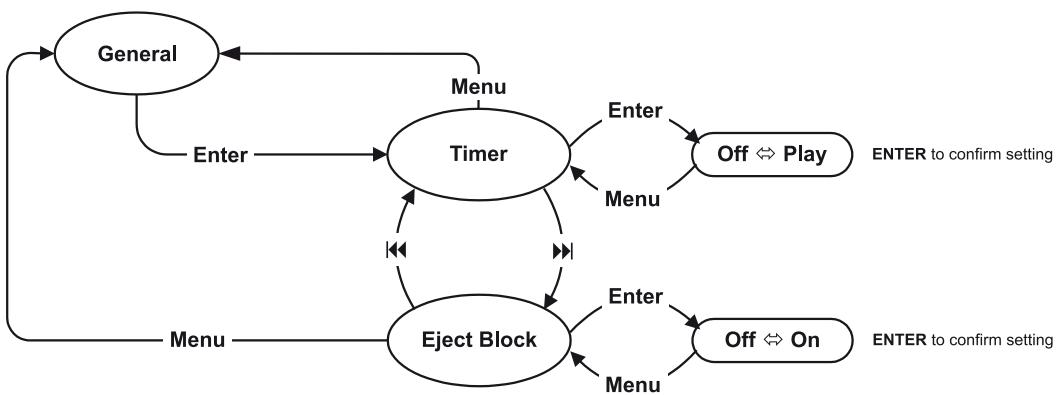


Record

Parallel Port



General



Appendix 3 - Firmware Updates

As a responsible manufacturer, HHB adopts a policy of continuous product development. As with all software-based products, it may be desirable from time to time to update the firmware in your CDR-882 with a more recent version. You can contact your HHB dealer or distributor, or visit the HHB website at www.hhb.co.uk for details.

Firmware updates are downloadable from the HHB website, or if you prefer, from your local dealer/distributor on a CD. Alternatively, if you are uncertain about performing a firmware update yourself, take your CDR-882 to your HHB dealer, who will be happy to do it for you.

Performing a firmware update restores all menu settings to their original factory defaults. If you are used to using your CDR-882 for one particular type of work, it may be worthwhile checking through the menus and noting the current settings so that they can be easily restored after the update.

Updating the firmware requires a PC or Mac fitted with a CD-(or DVD-) writer drive, and a CD-writing software application. We recommend you read through the instructions below before performing an update for the first time.

To perform a firmware update, proceed as follows:

- Download the new firmware from www.hhb.co.uk. It will be in the form of a .wav file. Save it to a suitable location
- Using the CD burning application you have on your computer (such as Nero or Roxio), create a CD containing the .wav file. The CD must be an audio CD, not a data CD, and the .wav file must be the only track on the CD
- Turn on the CDR-882, put the burnt disc into Drive1 and close the tray. Note that the update CD must be the first CD loaded after power is applied to the unit; if there is already a disc in Drive 1, remove it first and reboot the CDR-882 (turn it off and then back on) before loading the update CD
- After the disc has been read, a dialogue screen will be displayed asking for confirmation to update the firmware. Press **RECORD** to continue or **STOP** to abort
- The firmware update will now proceed automatically. The progress of the update procedure is displayed by the L bargraph meter. Also, the display will show a succession of messages:

!!! Updating OS !!!

Do not disturb power

Erasing flash completed

Writing flash completed

!!! Reboot !!!

- During the update procedure, it is essential that the power supply to the CDR-882 is not interrupted. Should this occur, the unit will be rendered unusable and will require factory re-initialisation

- When the disc has been read, the drive tray opens automatically; the disc may now be removed. The disc tray will not close automatically; this is normal
- Reboot the unit by powering off, then back on. Further internal file re-writing now takes place; while this is in progress, the front panel may appear to be completely dead. This step may take up to 30 seconds; do not press any buttons while it is proceeding
- When the update process is complete, the unit will boot up in the normal way

NOTE: We cannot guarantee that all CD-writing applications will create a compatible audio CD.

Appendix 4 - Factory Defaults

The table below lists all the menu options and their default factory settings.

MENU	OPTION	SETTING
AUDIO	Digital Input Level	0dB
	Input Balance	Centred (L=0dB, R=0dB)
	Fade-in Time	4 seconds
	Fade-out time	4 seconds
	Input Dither	Auto
	Phones Mix	1 + 2
	Output Mix	As phones
CLOCK	Clock Source	Auto
DISPLAY	Contrast	18
	Invert	Off
EDIT MARKER	Direct Mark	{all fields empty}
	Auto-Cue Threshold	-46dBFS
DISCSPAN	Multi-Machine	Off
	Master/Slave	Master
	Fade-in Time	4 seconds
	Fade-out time	4 seconds
	Overlap Time	4 seconds
RECORD	Record Sync	Record Start/Stop + Track
	S/PDIF REC Start Trigger	S/PDIF Subcode
	Auto Track ID Trigger	S/PDIF subcode
	Audio Threshold	-72dBFS
	Track Length	1 minute
	Auto Finalize	Off
	Digital Output Format	Consumer
	SCMS	Permit Copies
	Copy Speed	Low
	Eject Block	Off
PARALLEL PORT	Preset	Default
	Input 1	Play/Pause
	Input 2	Record
	Input 3	Stop
	Input 4	AMS +
	Input 5	AMS -
	Output 1	Play
	Output 2	Pause
	Output 3	Record
GENERAL	Timer	Off

Appendix 5 - Specifications

Functions	Specifications
Frequency Response	5-20kHz ±0.5dB
S/N Ratio	96dB (16-bit limit)
THD+N	0.002% (16-bit limit)
Channel Separation	>90dB
Max Input Level	24dBu (XLR) 10dBu (RCA/Phono)
Output level	(0dBFS) 20dBu (XLR) 6dBu (RCA/Phono)
Input Impedance	>10kΩ (balanced) >5kΩ (unbalanced)
Output Impedance	<50Ω
Headphone Output	1/4" stereo jack
Digital I/O	AES/EBU 110Ω XLR S/PDIF 75Ω RCA/Phono coaxial S/PDIF Toslink optical
Word Clock Input	44.1kHz - 75Ω BNC with switchable termination
Digital Input	32-96kHz via sample-rate converter
Remote Control	Infra-red RS232 9-pin opto-isolated parallel
Format	CD audio recordable
Compatible Media	CD (playback); CD-R; CD-RW
Power Supply	100-240V 50/60Hz
Power Consumption	25W
Weight (Ex Packaging)	6.7kg/14.7lbs
Height with feet	95mm (3.75 inches)
Height without feet	88mm (3.5 inches)
Depth	322mm (12.5 inches) – excluding connectors
Width	482mm (19 inches)
Supplied Accessories	Remote control 2 x AA batteries Power cord Operating instructions 2 x HHB CDR80HS recordable CD



Notes





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